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ABSTRACT

This highly illustrated monograph includes 22 projects developed by students in a basic photography course that can be inexpensively reproduced by students or by anyone interested in photography. Instructions are provided for making 14 photographic accessories, including a film washer, drying cabinet, camera copy stand, and bounce flash diffuser. Also described are useful and innovative processes such as combination printing, high contrast photography, sepia toning, photosketching, pinhole photography, photograms, and dry mounting. Forty-eight print and nonprint resources are listed. (Author/LLS)

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PHOTOGRAPHIC PROJECTS AND PROCESSES

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PREFACE

The projects compiled in this book are the result of a creative effort by an enthusiastic group of photography and graphics students. As part of the requirements in a basic photography course, four classes of students were asked to develop small photocommunication projects useful to beginning photographers. They were requested to develop projects or processes which could be constructed or carried out with relative ease. The activities were required to be less expensive than a commercially equivalent item.

Each quarter as students reported to the class about their completed projects, requests were often made for reprints. Many students suggested that projects be put in book form, and that is what we have done. Over forty-five projects were produced in the four photography class sections and we were only able to include twenty-two of them in this text. A few of the projects were duplicates, but many remain that we hope to compile in a second book at some later date.

My EAV/EIA 521/721 Graphic Technology class has been responsible for putting this book together. It has been a major project for the class, and they have performed well as a small printing operation. Areas of responsibility were assigned and everyone worked many hours to see the text to completion.

I particulary want to thank the editorial staff, Bo Attwood, Elaine King, Marilyn Karrenbrock, Carolyn Smith, and John Williams for their many hours of assistance. Without the typesetting expertise of Elaine King and Marilyn Karrenbrock, we would not have been able to meet our restricted deadline. In the layout area Rick Mosso, Sherri Sun, and Lewis Mazanti have been life savers. Carolyn Smith has saved us many hours of work by specifying all illustration sizing and has done an excellent job of converting many weak photographs into line drawings that communicate. Anne Forbes, Nestor Munoz, and Gary Carter have kept us supplied with line and halftone reproductions upon request and have done a professional job of photographing our final negatives. Tim Watts, as production manager has continually checked on the flow of work and stepped in for me when individual students needed assistance. As this is written the workers in the plate making and press areas have yet to start their hectic work. I am sure that Cece Layson and Gary Carter in the plate area and Jay McArthur and Bo Attwood in the press area will work many hours in the next week to assure that the final step in our produciton process is as professionally handled as the many others have been. Most students worked in two or more production areas and worked well in each.

"...one night, when, having imposed my forms, I thought my day's work over, one of them by accident was broken, and two pages reduced to pi, I immediately distributed (the type) *and composed it over again before I went to bed; and this industry, visible to our neighbors, began to give us character and credit..."*

Benjamin F ranklin, 1728

I hope our "industry" will help readers come away from this book with a great deal of practical information and an appreciation of photography as one of the most important forms of communication.

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PHOTOGRAPHY IN THE SCHOOLS

Photography is more than a way to reproduce an image. In the hands of a creative teacher, it is a motivational tool greater than any other available to us in the schools. Used wisely and incorporated into everyday learning, photography can assist the classroom teacher to motivate the slow learner and challenge the advanced student. Photography should not be used as a reward for the gifted, but as a motivator for students at all levels.

There are many good books and periodicals covering the subject of photography. No single publication can possibly provide all the information needed. This text is written as a guide for teachers, media specialists, and beginning photographers who already have a basic knowledge of black and white photography but would like to expand this knowledge of the photographic process. It is designed to carry you through a series of processes or construction projects. This information should be helpful to the classroom teacher or media specialist who is interested in integrating photography projects into the curriculum. A bibliography is included at the end of the book to provide you with further resources.

The projects and processes in this text were developed by students in a basic photography course as part of the course requirements. Many of these students were media majors or classroom teachers who are aware of the needs of school children and the realm within which these needs can be met. Selection of the material included in this book was made with two main criteria in mind. First, projects were selected that could be constructed with easily obtainable material. A second consideration was whether it would be more economical to make the project than to purchase it.

THE BASICS

If you are going to use photography in the classroom, there are certain basic items necessary. If the extent of involvement means only photo reports by students, then very little is needed. But if you want to introduce your students to developing black and white photographs, or possibly color, then a little bit more time and money will be necessary.

Every school should have at least one camera. If for no other reason, a camera is necessary to document day to day school activities. Many parents are good at photography and enjoy helping the school out with documenting special events, but these volunteers are not readily available during the school day when many of the most important activities occur.

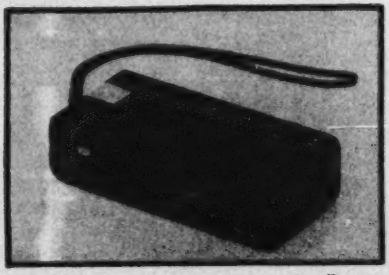
CAMERAS

Cameras can range from $9.95 pocket instamatics to cameras costing over $1000.00. But what do you want? The first step is to study your needs. Do you want a camera to photograph PTA programs or do copy work from books? Is it important that the camera have interchangeable lenses? Do you need accessories?

A basic camera system might consist of a moderately priced 35mm single lens reflex camera, copy stand, two flood lights, and one automatic flash unit. This basic system would enable students and teachers to photograph daily school activities, photograph small objects using the copy stand or copy photos from books with the addition of lights and a close-up attachment or macro lens.

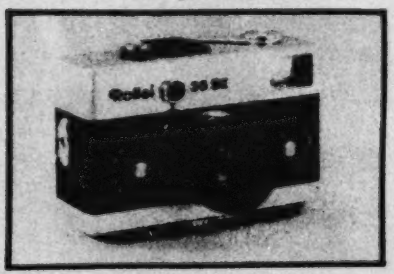
TYPES OF CAMERAS

1. Pocket Cameras were developed primarily for taking snap shots. Negative size is very small so enlargements over 8 x 10" cannot be made without degrading the image. Most pocket cameras have plastic lenses which lower picture quality slightly. Total automation is used in these cameras and most have fixed focus. This type of camera will give you acceptable pictures, but students gain little knowledge of photographic principles and procedures.



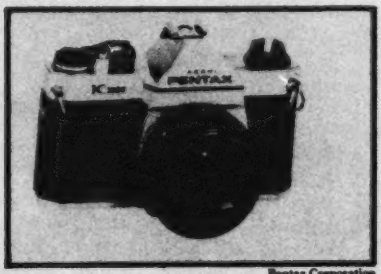
Keystone

2. 35mm Rangefinder uses 35mm film which gives acceptable enlargements up to 11 x 14" or 16 x 20" depending on the quality of the camera lens. Prices run from $85.00 up to $800.00 with most falling in the $100.00 to $150.00 range. These cameras can be purchased with total automation (camera sets shutter speed, lens aperture opening, and focuses.), manual controls, or a combination. Most rangefinder cameras do not have interchangeable lenses and because you focus through a rangefinder set off from the taking lens, close focusing is difficult. These are good cameras for student usage in everyday photo situations, particularly if manual override is possible.



Rollei of America, Inc.

3. 35mm SLR(Single Lens Reflex) is the recommended camera for most school settings if it is the only camera in the school. When first designed, the 35mm was not readily accepted. The initial slow reception has been replaced with a rush by almost every serious amateur and professional to own a 35mm camera. With mass merchandising of the past few years and the advance of automation into the 35mm SLR format, many people purchase as a first camera an automatic or semi-automatic 35mm single lens reflex camera. The single lens reflex allows interchanging lenses so you may use a telephoto for subjects far away and a wide angle for large subjects too close to the camera. Since SLR viewing systems allow you to view the subject through the taking lens, the picture should be correctly focused and framed each time. Even close-up focusing is easy if you have a macro lens or close focusing adapters. The macro lens focuses from infinity (as far as you can see) to within five or six inches of the subject so it is a very versatile lens. A 50mm macro lens may be purchased as the prime lens for the camera and used for everyday photography as well as for close-up work. A macro lens does not let



Pentax Corporation

as much light pass through as a normal lens, but the difference is slight and will not be a drawback in most photographic situations.

4. Medium and Large Format Cameras include any camera using film larger than 35mm. A 120 roll film camera is available in a number of formats (6 x 6 centimeters, 6 x 7 centimeters). Larger format cameras include 4 x 5", 5 x 7", and 8 x 10" view cameras. These larger format cameras are used when extreme enlargements are needed from the film. This group of cameras is not practical in most school settings because of their bulk and the cost of film used in them.

Bell & Howell.Mamiya Company

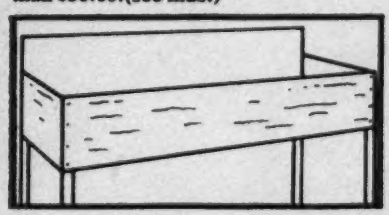
5. Instant Cameras include cameras that provide a print within a short time after exposure. Their main benefit is instant development. Instant camera film is relatively expensive per shot and sometimes the color quality is poor. If you need finished prints quickly, then consider the instant type, but if you want to enlarge or project the final picture, go with a standard film camera.

A STEP FURTHER

If your photography interest lies beyond taking the picture and sending it off to be developed, then you must go a step further. This takes a bit of planning if you want to involve students in developing and printing photographs. The first question is where can photography be done in a school setting? Unless you are one of the lucky few who work in a school with a photo lab already built in, then you will have to start planning. The first phase is to inventory any possible space that may be used. An ideal location will have running water, light control and convenient access. A good place to consider is a media center workroom. This would provide easy access for most students and simplify the task of monitoring darkroom use. Another advantage of the media work area is that running water is probably already available. Other good locations may be in art rooms or graphic arts areas in the Industrial Arts Department. Darkrooms should not be located in or near dusty work areas.

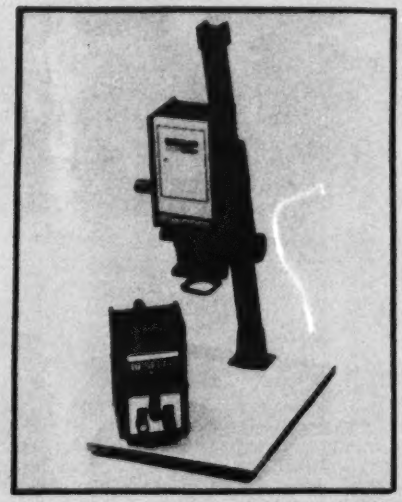
When first setting up a darkroom, there are several pieces of necessary equipment and many items that will make the work more pleasureable. Equipment to make darkroom work tolerable includes:

Sink — A darkroom sink should be large enough to hold all chemical trays. Sinks for this purpose are available commercially but with a little ingenuity, some plywood, and marine epoxy you can construct a very serviceable sink for less than $50.00.(see illus.)



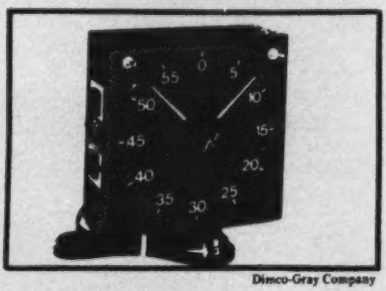
Enlarger - Although you can develop film in a darkroom, without some method of enlarging negatives, the real thrill of photography is lost. Enlargers range in price from $70.00 to several thousand dollars with extremely good ones averaging about $200.00 with lens and negative carrier. There are two basic enlarger types, condenser and diffusion. Condenser enlargers pass light through a condensing lens and then the negative. This type of enlarger is used for black and white prints because they provide better contrast and sharper images. Diffusion enlargers have a diffuser, usually a piece of opal glass, to soften and spread evenly the light passing through a negative. Diffusion enlargers are designed primarily for color enlarging.

Most diffusion enlargers have color heads which contain filters to correct color balance when printing color materials. If you never anticipate doing color enlarging, then a condenser enlarger will be the best choice for an enlarger. If color is in your future then a color enlarger may be worth the extra investment.



Beseler International Corp.

Color enlargers do fairly well with black and white negatives. If fact diffusion enlargers are a little more forgiving when you have dust or scratches on the negatives. Most condenser enlargers can be converted at a later time for color work with the addition of a color head.



Dimco-Gray Company

Timer - You will be doing two primary timing functions in a photographic area: developing film and enlarging and developing prints. Developing both film and prints usually takes minutes (9-10 for film and 1-2 for prints), therefore a good minute timer is best for this job. Enlarging on the other hand requires precise timing in seconds. A good automatic reset timer which turns the enlarger on and off is the best for enlarging. Small kitchen timers will be okay for minute timing until you can afford a little more sophisticated model. Some of the new digital timers work very accurately in both seconds and minutes and can be programed for multiple timing sequences. The more sophisticated a model obviously the greater the price. In a photographic area where several people work, it would be best to have a timer for each function (film development, enlarging, paper development) so more than one person at a time can work.

Film Developing Tank - Some type of developing tank is necessary to develop rolls of film. Most film developing tanks have reels on which to wind the exposed film. These reels are loaded with film in

total darkness and placed into the tank. Film tanks have light baffle tops which allow chemicals to be poured in and out without ruining the film. Film tanks come in plastic or stainless steel. The plastic reel mechanisms are a little easier for beginners to load. Later in this text is a project for the construction of a film developing tube which is easier for beginning students to load than most film reels. Two developing tubes can be constructed for the cost of one film developing tank.

Trays - Developing trays are necessary for developing photographic paper. Most trays are available in varying sizes from 4 x 5" up to 16 x 20" or larger. The most commonly used in darkrooms is the 8 x 10" size. The best tray is one with a smooth bottom. Kodak duraflex trays are very good. Many companies sell trays with various bottom ridges and groves which help with even development. But grooves and ridges are difficult to clean and many times chemical build-up and stain occurs. With proper agitation, flat bottomed trays give even development. All trays should be labeled and used for only one chemical to prevent contamination.

Tongs - Tongs must be used to transfer prints from developer to stop and from stop to fixer. Do not develop the bad habit of using your fingers to transfer prints from tray to tray. Chemicals on your fingers may ruin the next piece of undeveloped photographic paper you pick up.

Safelights - Panchromatic film must be loaded and developed in complete darkness (inside a light tight tank) so no safe lights may be used. Black and white photographic papers are not sensitive to some types of amber or yellow light so these lights can be used in the darkroom to help you see while making prints. The standard safelight for most darkrooms is the Kodak Wratten OC or OA amber lights. If you want to work with orthochromatic materials, such as Kodalith Ortho #2556 high contrast film, then a Kodak Wratten filter #1A red filter must be used. Safe lights should be of low intensity and at least four feet from the work area.

Print Easel - To hold photographic paper while making the enlargment, some type of print easel is necessary. Many types are on the market, but one of the best is the EZ-Easel which comes in various sizes for all standard paper sizes. Later in the text is a project for building an inexpensive borderless printing easel which can be very helpful.

Print Siphon - A siphon or some type of print washer is necessary to wash away remaining chemicals in a print. Resin coated papers require 75% less wash time so water can be conserved and processing time decreased.

Graduates - Chemicals must be measured accurately, so both a small and large graduate are needed. (8 oz. and 32 oz)

Thermometer - Thermometers range in price from three or four dollars up to several hundred for digital models with extreme accuracy. For black and white work an eight or ten dollar model will be satisfactory. For color work where a one-half degree difference is critical, a more expensive model will be necessary. ($25 - $30)

Stirring Rod - All chemicals must be thoroughly mixed so some type of stirring rod is necessary. Avoid metal spoons. Plastic stirring spoons or rods work fine.

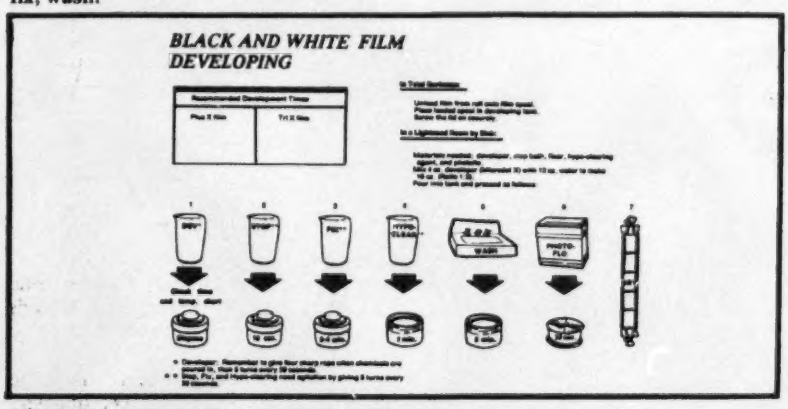
Drying equipment - Prints must be dried properly to prevent spotting and curling. Fiber base print papers dry

best with some type of heat dryer, but roll or paper blotters can be used. Resin coated papers need no special equipment for drying. Just squeegee off and hang them up to dry. Better still, later in this text are directions for building an inexpensive drying rack which will eliminate clothes lines of dripping prints.

STANDARDIZE PROCEDURES

With an adequately equipped photographic area, it is now time to get to work. For a student darkroom to be efficient and effectively used, it is a good practice to standardize as many procedures as possible. Listed below are some hints that will make group work in the darkroom easier.

1. Label all chemical containers with not only the chemical name, but mixing directions and time and temperature recommendations also.
2. Standardize and use only one film developer and one paper developer. Microdol-X for film and Dektol for prints work very well, but you may have a combination you like better.
3. Standardize the order in which chemical trays are placed. We always work from left to right: developer, stop, fix, wash.
4. Teach students to be sure that all light sensitive materials are covered before turning on room lights.
5. Place negatives in a protective sleeve. "Print-file" negative sleeves work well because they allow you to make a contact print with the negatives still in the sleeve.
6. Always make a contact print of your negatives and store the contact with the negatives.
7. Handle negatives as little as possible. Leave them in a protective sleeve until they are placed in the enlarger.
8. Make a test strip for each negative that is to be printed.
9. Plug in all devices, put things where you want them and make it known that the darkroom has been standardized and that everything is to be kept in its place.
10. Post a list out-lining clean-up responsibilities.
11. Charts for standardized procedures such as loading a camera, film development (see fig.), enlarging, paper development, and so forth are very helpful reminders for student darkroom workers.



Wall charts such as this help students with photographic processing.

PHOTOGRAPHIC PROJECTS

The following photographic projects can be constructed inexpensively from readily available materials. No special tools are necessary, so all can be put together in a school or home workshop. The completed projects will make darkroom work easier and photographic shooting sessions more enjoyable.

FILM DEVELOPING TUBE

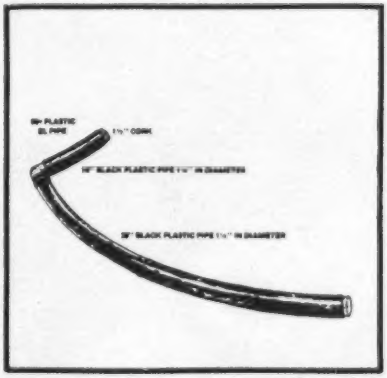
Project: To construct a Tube Developer that will simplify the loading process of 35mm film for development and also improve the development process by providing more uniform coverage of the film with the chemicals

MATERIALS:
1. one (1) section of black plastic pipe measuring 36" in length and 1¾" in diameter
2. one (1) section of black plastic pipe measuring 10" in length and 1¾" in diameter
3. one (1) 90 degree angle plastic pipe for 1¼" diameter plastic pipe
4. two (2) corks measuring 1½" in diameter
5. all purpose cement

CONSTRUCTION:
1. Place cement on the right angle section of pipe and push it into one end of the 36" pipe.
2. Glue 10" section of pipe onto other end of right angle section.
3. Place a cork in each end of the pipe to seal until ready for use.

USE: For developing film in Tube Developer, use the following steps:
1. Load film into tube. To do this you will need one (1) can opener, one (1) roll of 35mm film (20 exposures), scissors, and Tube Developer.
2. In total darkness, open film cannister with can opener. Pull film out gently with leader. Clip off leader of film. Holding film by edges, with emulsion side up and sides of film slightly curved in, gently slide film into tube at straight end. Opposite end of tube should be corked. Clip film from spool. Place cork in end of tube securely.
3. For developing Tri-X film (ASA400), mix chemicals as you would for development in traditional development cannister. Under a yellow safe light, pour 16 oz. of developer into tube and reseal. Using a constant, gentle right to left agitation, develop film for 10 minutes at 75 degrees. Pour out developer and proceed through remaining steps of the development process as you would using the traditional cannister with the exception of agitation technique. To ensure consistent, uniform coverage of film by chemicals, it is best to agitate tube constantly.

To ensure best results, run a test roll of film first, knowing what the correct exposure should be and bracketing. Note development time and agitation, temperature and strength of developer. After making a contact sheet, it will be easier to determine whether or not some adjustment is needed in time, temperature or agitation. The use of constant agitation in the Tube development process will probably dictate some adjustment in time required for development.



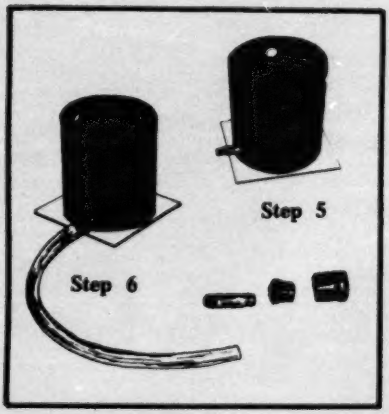
Elaine King

FILM WASHER

Project: To construct an inexpensive film washer which efficiently cleans film of excess chemicals by promoting a rapid turnover of water.

Materials:
1. a piece of four inch rubber pipe
2. three eighths inch plastic hose
3. one galvanized steel bushing
4. two galvanized nipples
5. hose connector for one-half inch iron pipe
6. five inch square of plexiglass
7. contact cement

Construction:
1. Drill drain holes at various points near the top of the four inch rubber pipe.
2. Drill an angled hole at the bottom of the four inch rubber pipe. This hole needs to be as close to the same size as the galvanized nipple as possible since the nipple will be placed in this hole. Use a small bit and drill a guide hole. Using the guide hole, a larger hole can be angled in such a way that water can enter the pipe and travel a circular path creating a vortex.



3. Cut the bottom of the pipe as evenly as possible to avoid leakage when plexiglass is used to seal the bottom. A band saw or large pipe cutter will give an even cut.

4. Using contact glue place plexiglass on the even cut on the bottom of the pipe.

5. Place one galvanized nipple in the angled hole at the bottom of the four inch pipe and put the plastic hose in place over the end of the nipple.

6. Assemble the other nipple, steel bushing, and hose connector and place at the other end of the plastic hose.

Use: Connect the plastic hose to a water outlet and place film into the washer. Water should run at a moderate speed allowing for two or three complete changes of water every minute. If film has previously been placed in hypo-clearing agent, wash time will be only five minutes. If hypo-clear was not used, wash time will be 20 minutes.

Finished Washer

Ben Warren

FILM DRYING CABINET

Project: The purpose of this project is to construct a film drying cabinet capable of being easily moved from place to place in a school or home. The cabinet, which measures 12" square by 48" high, holds six to eight strips of 20 exposure film or a combination of film and prints.

Materials:
1. four (4) 12" x 48½" plywood (or a 4 x 4' sheet)
2. one (1) 12" x 12¼" plywood
3. one (1) 12" x 12¼" pegboard
4. one (1) 2" x 4" x 48" lumber
5. one (1) 24" piano hinge (screws included)
6. one (1) hasp (screws included)
7. one (1) small padlock (or device to latch hasp)
8. six (6) 3" L-angles
9. twenty-four (24) ½" wood screws
10. sixteen (16) 3" nails
11. four (4) ball-bearing casters (screws included)
12. two (2) 5/16" screw eyes
13. one (1) 14" length of clothesline (or similar wire)
14. wooden clothespins
15. film clips or weights
16. one (1) hand-held hair dryer

Construction:
1. Assemble three (3) 12" x 48" sheets of ½" plywood into a three-sided box using the L-angles. Important: Attach side pieces to outside edge of back piece.
2. Cut two by fours into 12" lengths. Turn cabinet on side and nail two by fours across back, from one side of the cabinet to the other at both the top and bottom; then across the front of the sides at both the top and bottom to brace the cabinet. (Figure 1)
3. Turn upright and nail 12 x 12" plywood on top.

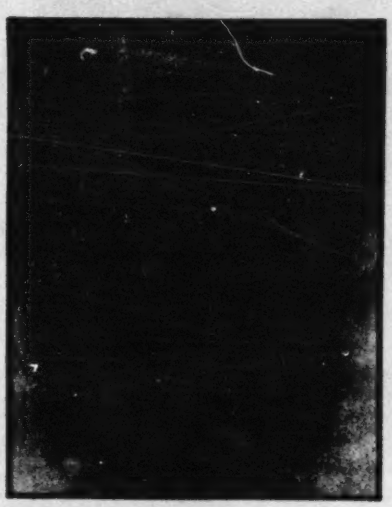


Figure 1.

4. Hold hairdryer in place and mark opening. (Figure 2)
5. Drill a hole in the four corners marked and cut opening for the hair dryer in top using a keyhole saw.

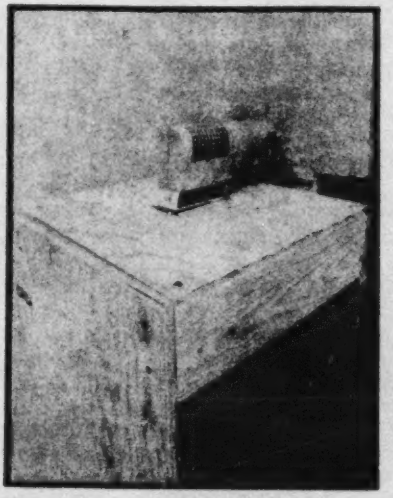


Figure 2.

6. Turn cabinet upside down and nail 12 x 12" pegboard to bottom.
7. Attach casters with screws to four corners.
8. Turn cabinet upright. On the fourth sheet of ½" plywood attach one side of the piano hinge to one 48" edge approximately halfway between top and bottom. This is the door of the cabinet.
9. Holding door with piano-hinged side up to the inside front edge of the left side of the cabinet, mark screw holes with a pencil and attach hinge to cabinet. This step requires two people: one to hold the door in place, the other to mark and attach hinge. (Figure 3)

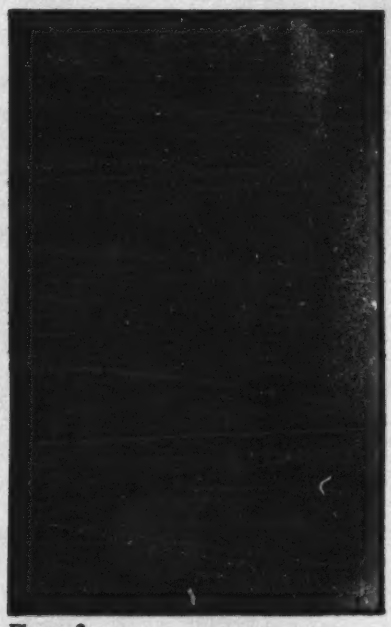


Figure 3.

10. Attach the part of the hasp with the hinge to side of cabinet on the right front edge approximately halfway between top and bottom.
11. Close door and mark hasp opening on front of door. Attach other piece of hasp to front of door. Keep hasp closed

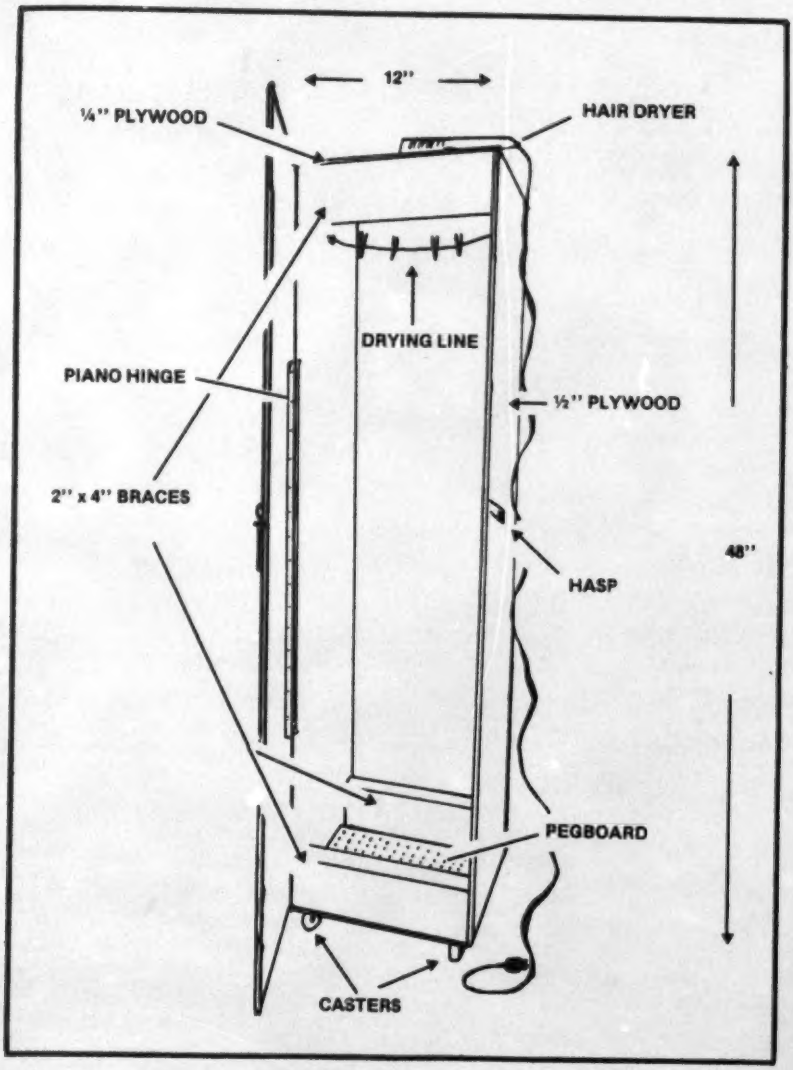
Figure 4.

by use of a padlock, large bolt or other device. (Figure 4)
12. Drill small holes through each "handle" of the clothespins approximately one inch down from top.
13. Attach screw eyes to interior sides of cabinet about four inches down from top. Thread wire through one eye and secure by twisting. String clothespins onto wire. Thread wire through opposite eye and secure.
14. The cabinet may then be stained, finished, painted, or left as is. If the hair dryer is removed, the hole can be covered by attaching a plywood disk (cut slightly larger than the opening) with a screw. Attach the disk loosely enough so that it can be rotated out of the way when the hairdryer is mounted on top.

Use: A dust-free area to dry film negatives after processing is essential to keep dust and lint particles in the air from adhering to the wet emulsion. The particles cannot be removed from the dry film and will cause small white spots

on a finished print. The film drying cabinet provides you a convenient place to do this.

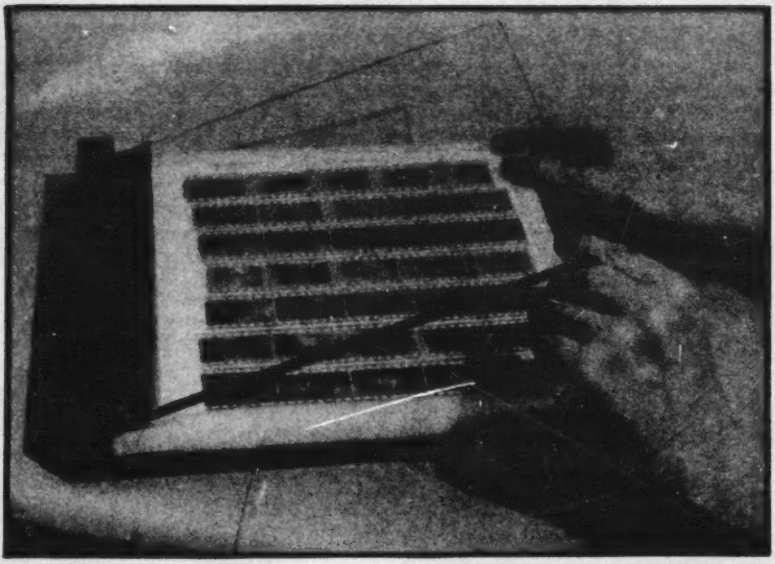
Sue Kenney



CONTACT PRINTING FRAME

Project: A contact printing frame is an invaluable tool for darkroom use. Its primary function is to provide a firm contact between the film and printing paper when proofing your negatives. This positive image of the negatives provides a permanent record of each exposure made. The frame described in this article is useful also in doing photo copy work where it is necessary to keep photos or clip art from curling up while copying them.

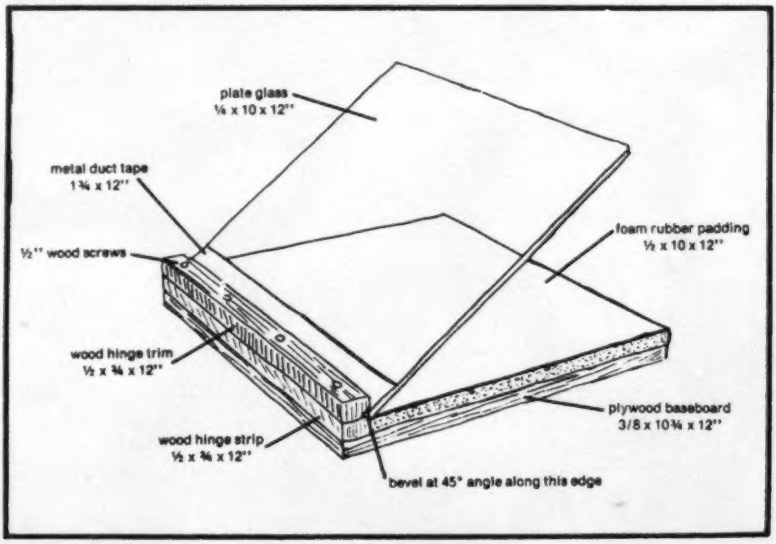
Materials:
1. one (1) 3/8" thick plywood baseboard 10¾ x 12"
2. one (1) ½ x ¾ x 12" wood hinge strip
3. one (1) ½"foam rubber padding 10 x 12" available from a carpet shop
4. one (1) ¼" thick plate glass 10 x 12"
5. two (2) pieces metal duct tape 1¾ x 12"
6. one (1) ½ x ¾ x 12" wood hinge trim which has a ¼" bevel along one ½" face
7. wood glue
8. white rubber cement (Duro)
9. four (4) ½" wood screws



Construction:
1. Attach the ¾" width hinge strip to the plywood baseboard along one 12"edge with wood glue.
2. Fit and attach foam rubber to the baseboard with white rubber glue.
3. Allow sufficient time for the wood glue and rubber glue to form a permanent bond. After the glue has set up, the plate glass should have the duct tape pressed on it both top and bottom along a 12" length edge. Approximately 1" width of duct tape should be fixed to the glass and the adhesive sides of the tape pressed together. This forms a hinge that is to be placed on top of the hinge strip.

4. Place the hinge trim with beveled edge facing toward the glass on top of the hinge strip and duct tape. Any excess tape extending from between the hinge pieces should be trimmed off.
5. Fasten the hinge trim to the hinge strip with four wood screws.

Use: Place a sheet of printing paper, emulsion up, in contact with negatives, emulsion down. Lower the plate glass and hold down during exposure. All the negatives in one roll of film are printed together. The contact sheet becomes a permanent file record of negatives on that roll.



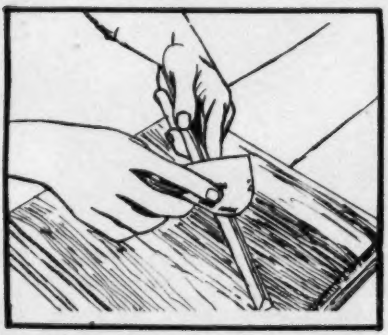
Jo Durrence

BORDERLESS PRINTING EASEL

Project: The purpose of this project is to construct a borderless enlarging easel to be used in making 8 · 10" prints.

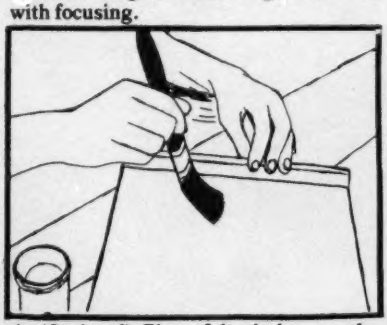
Materials:
1. one (1) ¾ x 9¾ x 10" wooden baseboard
2. two (2) 7/16 x 7/8 x 10" wooden strips
3. fine sandpaper
4. flat paint
5. four (4) felt pads
6. wood glue

Construction:
1. Use fine sandpaper to make a 1/16" wide bevel on the under inside edge of each of the 10" wooden strips. Make five to seven strokes covering the entire length of the strips on the under side of the inside edge. This will produce a slight bevel which when placed properly on the baseboard will catch the photographic paper slightly thus holding it in place without forming a border when the paper is exposed.



2. Glue the strips on each of the 10" sides of the baseboard leaving exactly eight inches between the .two inside edges of the strips. While the glue is still wet, an 8 x 10" print can be placed between the strips, and they can be moved slightly to insure proper placement. The strips should only slightly touch the edges of the paper. If the paper is under the strips, they should be moved farther apart. After the glue dries, the strips may be tacked to the baseboard with wire brads to give more durability to the easel.

3. After sanding, paint the easel the color preferred. A light color allows greater ease in focusing. Painting also covers wood grain which might interfere with focusing.

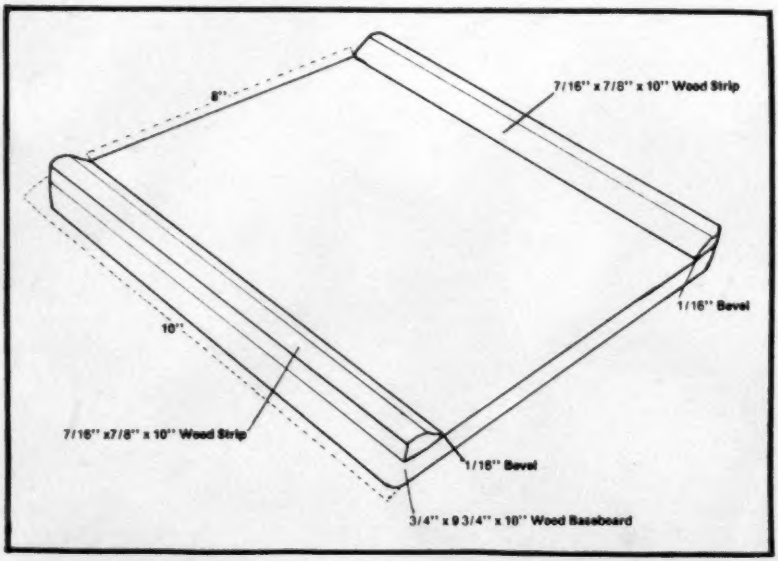


4. (Optional) Place felt circles on the four corners of the under side of the baseboard of the easel to prevent slipping when placed on the baseboard of the enlarger.

Use: Paper placement differs in the use of this easel and a border easel. Rather than sliding the paper into the easel, place the paper against the inside edge of one of the strips along one of the 10"

sides, bow it slightly, and place the other paper edge against the remaining strip. Position the paper by moving it until all four corners are against the inside edges of the strips. When paper is properly positioned, the easel can be turned upside down and the paper will remain in place.

Carolyn Smith



DISTORTION CONTROL EASEL

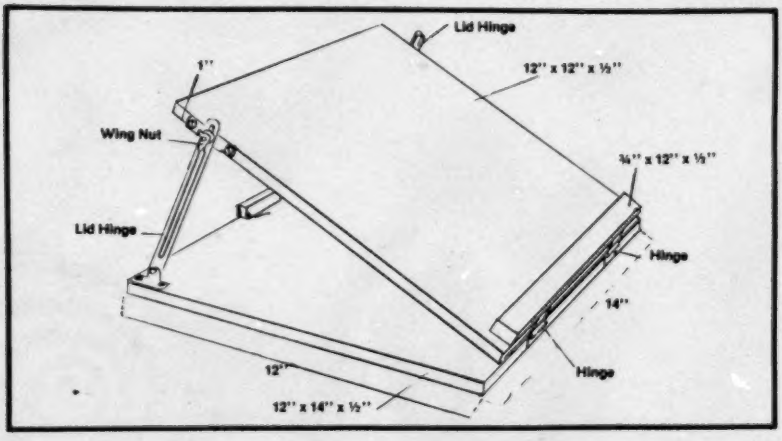
Project: The purpose of this project is to construct a distortion control easel to be used to correct distortion in 8 x 10" prints.

Materials:
1. 2 packages of lid hinges
2. 2 ¾" screws and wing nuts
3. 1 package of 1" hinges
4. 1 - 12x12x½" plywood board
5. 1 - 14x12x½" plywood board
6. 1 - 2½x½x½" plywood strip
7. 1 - 12x¾x½" plywood strip
8. 1 - ¾"nail, Elmers Glue and stain

Construction:
1. Lay the 12 x 12 x ½" board on top of the 12 x 14 x ½" board placing it so there is 1 inch on either side of the 12 x 12 x ½" board.
2. Place the 1" hinges on one of the 14" sides of the board connecting the top and bottom boards. They should be placed three inches from each side of the bottom board leaving six inches between them.
3. Take the original screws out of the lid hinges and put in the ¾" screws. The screws should be placed so that their heads will be against the boards when the project is completed. Then screw on the wing nuts.
4. Put the lid hinges on the corners of the 12 x 12 x ½" board placing them on the opposite end of the board from the 1" hinges attached in step 1. Place these hinges so that the hinge bar is parallel to the side of the 12 x 12 x ½" board. Screw in the hinges.
5. Take the moving bar of the hinge and place it one inch from the end of the 12 x 12 x ½" board. Screw these into each side of the board.
6. Glue the ¾ x ½ x 12" strip on top of the 12 x 12 x ½" board on the end opposite the lid hinges. The strip should be flush with the end of the board.
7. (optional) Stain the easel.

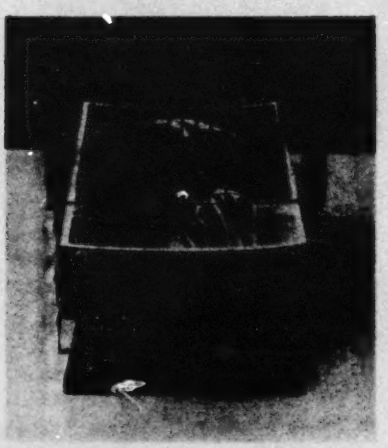
Use: Distortion control, used in the process of enlarging, helps correct converging lines. When tilting the paper under the enlarger, the image is elongated in the direction of the tilt. The steeper the angle, the longer the stretch. Just place a border or borderless easel on the distortion easel and adjust the screws for the angle needed.

Sarah Withers



PRINT DRYING RACK

Project: To construct from inexpensive materials a drying rack to be used in making prints measuring 8 inches by eleven inches or smaller.



Materials:
1. four cake cooling racks measuring 9 inches by 10 inches
2. three wood strips measuring 9 1/2 inches by 1 1/2 inches by 3/4 inches
3. one wood baseboard measuring 8 1/2 inches by 9 3/4 inches by 3/4 inches
4. six screws measuring 1 1/2 inches
5. paint

Construction:
1. Use a saw to make four 1/4 inch grooves on the three 9 1/2 inch by 1 1/2 inch by 3/4 inch wooden strips. Make the first groove 2 and 3/4 inches from the bottom of each strip and space the other grooves 2 inches apart.
2. Place the bottom of one wooden strip in the middle of one of the 8 and 1/2 inch sides of the baseboard. Do this by measuring 3 and 1/2 inches from each end. Square the strip to the bottom of the baseboard. Use two screws to attach the strip securely to the baseboard.
3. Place the bottom of each of the other two wooden strips against the two 9 3/4 inch sides of the baseboard. These are not to be placed in the middle of the baseboard sides, but set back to give added support. Measure 3 1/4 inches from the back of the baseboard, where one wooden strip is already attached, and 5 inches from the front of the baseboard. Square the strips to the bottom of the baseboard. Use two screws on each wood strip to attach it firmly.
4. Paint all areas.
5. Snap the wire racks into position.

Use: Any print measuring 8 1/2 inches by 11 inches or smaller will easily fit on the racks. By utilizing the four racks and the baseboard, space is provided for drying five prints. If more space is needed for drying prints, more racks can be added during the construction of the frame. Stability would be ensured by making the grooves into which the racks fit closer together.

Sydney Chambers

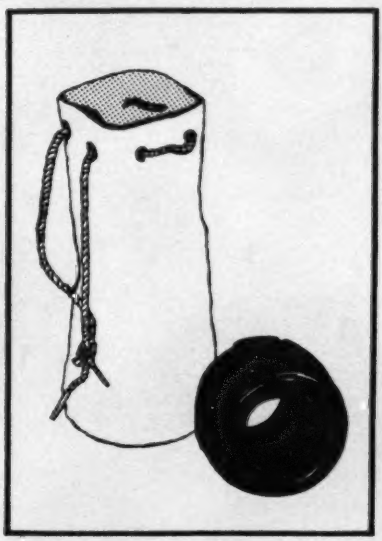
LENS BAG

Project: To make a lens bag of durable quality to carry a normal or macro lens for a 35 mm camera.

Materials:
1. paper pattern: circular piece, 4½" diameter; rectangular piece 11 x 7"
2. fabric such as chamois, suede, naugahyde, or leatherette
3. a drawstring
4. rivets
5. sewing machine, needle, thread, pins, scissors, and a hole puncher

Construction:
1. Measure the lens diameter and length. Using these measurements, make two pattern pieces, a 4½" diameter circle for the bottom of the bag, and an 11 x 7" rectangle for the sides.
2. Place the pattern pieces on a single thickness of fabric and cut one of each.
3. Hem what will become the top of the bag by turning under ¼" along one of the 11" sides of the rectangular piece of fabric and stitching.
4. Place the circular fabric piece along the other 11" edge of the rectangular piece with right sides together. Baste with a needle and thread to hold in place. Machine stitch using a ¼" seam, and remove the basting thread.
5. With right sides of the fabric together and using a ¼" seam, stitch the 7" sides of the bag together. Turn the bag right side out.
6. With the hole punchers, place eight rivets, evenly spaced, around the top edge of the bag being sure the rivets are placed in the double thickness of the ¼" hem.
7. Thread the drawstring through the rivets along the top of the bag.

Use: A lens bag made of one of the suggested fabrics will protect the lens when it is not in use. In constructing the lens bag, a fabric that is waterproof is preferable in that more protection for the lens is afforded. By changing the pattern dimensions, a bag can be constructed to fit any lens size.

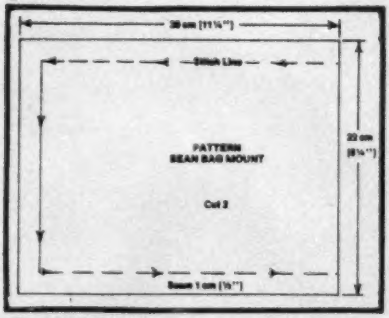


Annette Webb

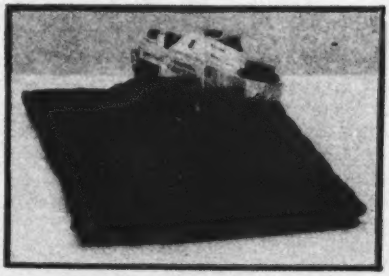
Bean Bag Mount

Project: The purpose of this project is to construct a portable bean bag mount to be used as a temporary tripod.

Materials:
1. one (1) 20 x 19" piece of heavy duty cloth such as denim, canvas, or corduroy
2. heavy duty thread
3. dry beans
4. paper
5. measuring tape, scissors, straight pins, needle



Construction:
1. Make a paper pattern measuring 11¼ x 8¼". Pin the pattern to a double thickness of material, and cut the two fabric pieces at the same time.
2. With the right sides of the fabric pieces pinned together, either machine or hand stitch around three sides of the bag with a ½" seam. You will sew on the wrong sides of the material and leave one side of the bag open. If hand stitching, use small stitches.
3. Turn the bag right side out, and fill with enough beans so that it will hold the camera steady. Do not stuff the beans so tight that the bag can not be folded in half. This will destroy the versatility of the bean bag mount in that you want to be able to fold it in half and still have the bag lie flat.
4. After pressing the seams with your fingers, machine stitch the last side together. If making the bag by hand, you can whip the edges together with a needle and thread.



Use: The portable bean bag can hold a camera to make pictures close to the ground or can be used to support a camera on a table or stool. By folding the bag in half, added height can be gained. Since the bean bag mount will be used out of doors as well as inside, the material used in its construction should be heavy, durable, and sturdy.

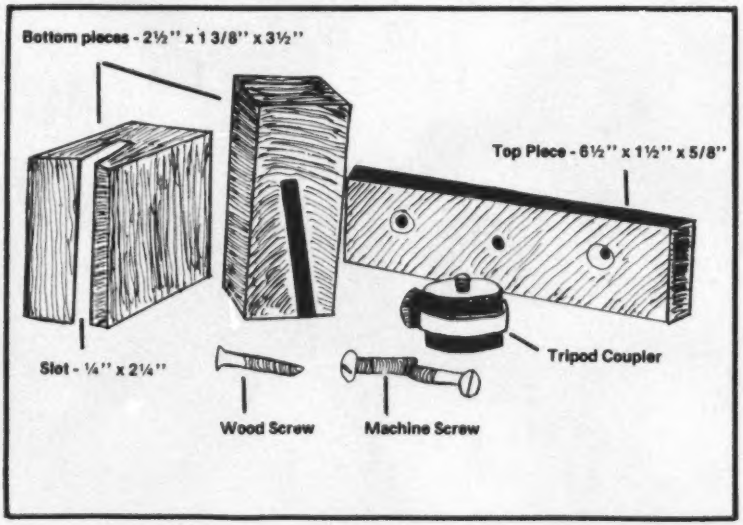
Maribel Franklin

CAR WINDOW MOUNT

Project: The purpose of this project is to construct a camera mount that can be attached to a car window.

Materials:
1. one (1) 6-1/2" x 1-1/2" x 5/8" piece of wood
2. two (2) 2-1/2" x 1-3/8" x 3-1/2" pieces of wood
3. a tripod coupler
4. two (2) 1-1/4" long wood screws
5. one (1) 1/4" machine screw

Construciton:
1. Cut a 1/4" x 2-1/4" slot in each of the 2-1/2" x 1-3/8" x 3-1/2" pieces of wood. To determine the angle of the slots, hold the pieces of wood next to the window in the position in which they are to be placed when in use and draw the slots on the sides of the wood. Adjustments may have to be made in the size of the cuts to ensure fit onto your car window.
2. Position the machine screw in the middle of the top piece of wood. This screw is to hold the coupler in place on top of the window mount.
3. Attach the top piece of wood to the two bottom pieces with the wood screws.
4. Screw the coupler onto the machine screw which is sticking out of the top piece of wood.



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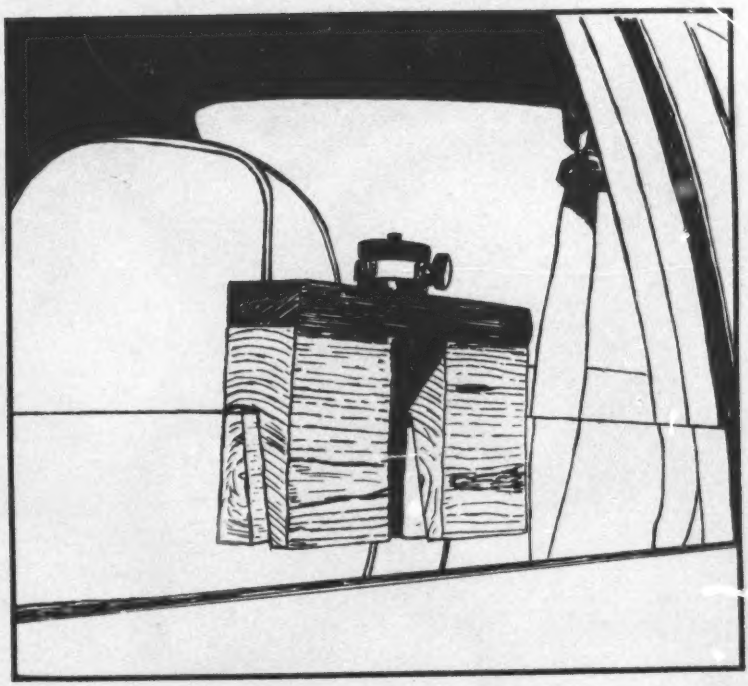
Use: The car window mount is used in situations when it is necessary to photograph without leaving the car. With the camera attached to the coupler, the mount can be slipped into position on the car window easily. This device is very helpful when photographing wildlife which might be disturbed by a slight movement.

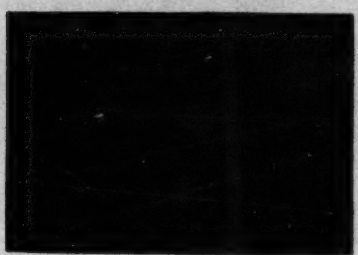
CeCe Layson



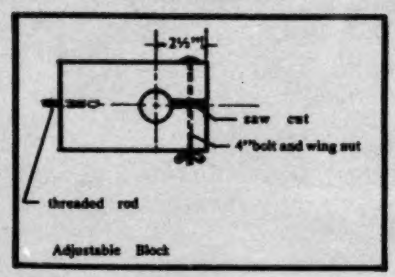
CAMERA COPY STAND

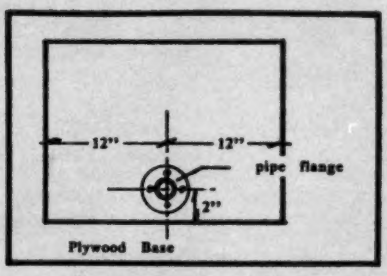
Project: To construct an adjustable copy stand to be used with a 35 mm camera.

Materials:
1. 20 x 24" piece of ¾" plywood, A/C grade
2. 6" block of clear pine 2x4
3. 24" long iron pipe nipple, 1" inside diameter
4. threaded iron flange to hold pipe
5. 3/16 x 1" stove bolts, nuts and washers
6. ¾ x 4" bolt, wing nut and washers
7. ¼" threaded rod, standard camera mount thread
8. nylon tack glides
9. camera thread-mount attachment, such as ROWI Ball and Socket Head



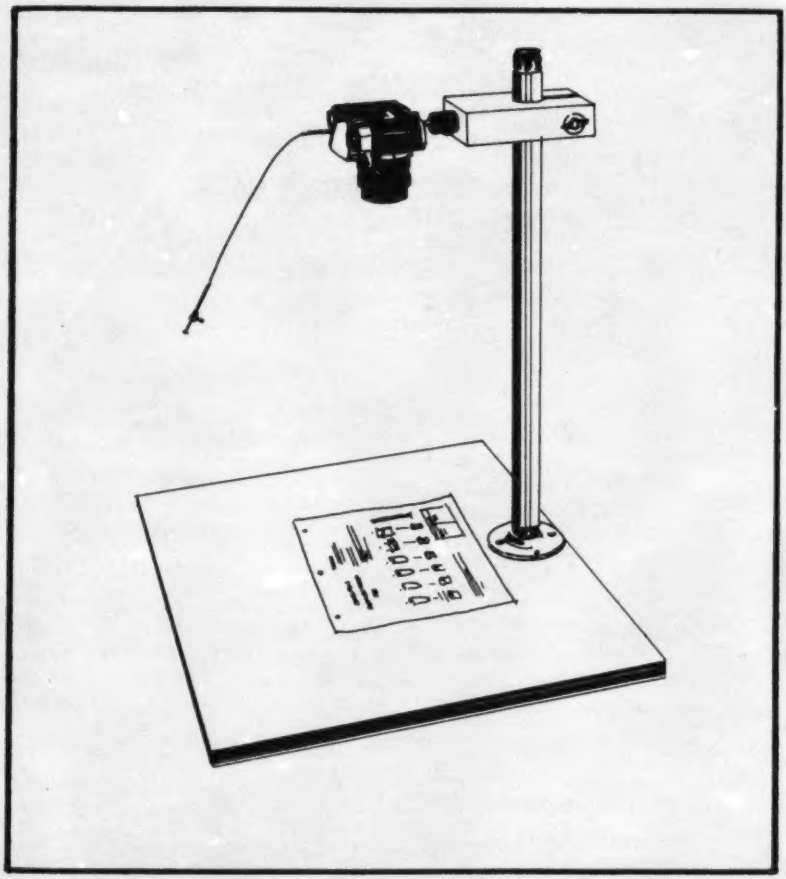
Construction:
1. Cut 2x4 block and plywood base to size. Sand all surfaces and coat with clear shellac, or two coats of neutral color paint if desired.
2. To make adjustable block, drill 1 3/8" diameter hole through block, centering hole 2½" from one end of block.
3. Make one saw cut into hole from short end of block.
4. At short end of block, drill 5/16" hole through 4" dimension; 4" bolt with wing nut should fit easily into this hole.
5. At opposite end of block, drill ¼" hole into block for threaded rod, which will attach camera-mount device to block. Cut threaded rod to length needed and sand ends. Attach camera-mount device to block.
6. To make plywood base, with smooth surface of plywood up, center pipe flange on one 24" side of base, with center of flange 2" from edge of base. Drill holes for stove bolts and bolt flange securely to base.
7. Tack nylon glides to bottom of base at corners, for feet.
8. Thread pipe nipple into flange and tighten firmly.
9. Slide adjustable block onto pipe. Secure in position by tightening wing nut. Attach camera to thread-mount. Copy stand is now ready for use.





Use: This copy stand provides a stable, adjustable support for a 35 mm SLR camera when photographing small flat materials such as title cards, pages from books or magazines, documents, etc. A copy stand is especially useful in producing slide presentations. The stand allows sharp, accurately-framed reproduction of charts, graphs, or photographs from books, and professional-looking title slides can be made. Most items 8 x 10" or larger can be photographed in sharp focus with a normal 50 mm lens. Smaller materials would require close-focusing attachments or a macro-lens. Proper exposure can be determined by using a light meter or by bracketing shots. Photoflood lamps may be necessary for good even illumination of subject.

Barbara Koenig

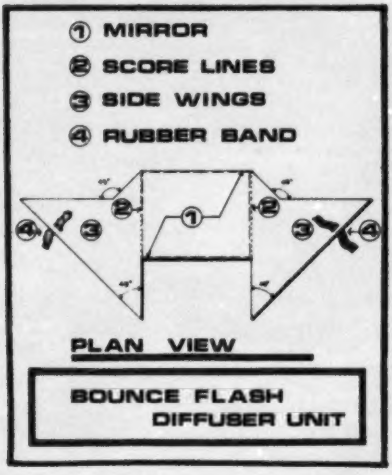


BOUNCE FLASH DIFFUSER UNIT

Project: To design a method for converting a standard electronic flash unit to bounce flash capabilities.

Materials:
1. black matboard measuring approximately 12 inches by 18 inches
2. glass mirror
3. double stick tape
4. black mystic tape
5. rubber band
6. T-square
7. 45-45-90 triangle
8. exacto knife
9. metal straight edge ruler
10. pencil

Construction:
1. Measure the flash unit to determine the size mirror required. The mirror, positioned at a 45 degree angle to the flash unit, should capture and reflect all light emitted from the flash. When positioning the mirror, be sure that the light sensor of flash units with automatic and manual modes of operation is not covered.



2. Following the example plan view diagram, prepare a pattern on paper using the dimensions of the flash unit and mirror. This should be done using the T-square and triangle to insure accuracy. A prototype of the unit can easily be made from light cardstock to refine the design and make any necessary adjustments.

3. Once the pattern and/or prototype are satisfactory for your flash unit, draw the pattern on the black surface of the matboard. These lines should be drawn with the T-square and triangle to insure accuracy. All measurements should also be accurate. A dotted line can be drawn to indicate the areas to be scored to allow bending the side wings in place.

4. Following the lines on the matboard, begin cutting the frame. All cuts should be done with a metal straight edge and sharp Exacto knife. This should result in straight clean cuts. Cut slits in the side wings to accomodate the rubber band. Score but do not sever the matboard at the edges of the mirror location as illustrated in plan view diagram. This will permit easy bending of the side wings.

5. Apply double stick tape to the back of the mirror and position it on the area indicated by the plan view diagram. This will be the white side of the matboard. Bend the side wings to approximately 90 degree angles and reinforce the score lines with black mystic tape. Slide the rubber band through the slits in the side wings and secure with overhand knots on each end. The rubber band should compress the side wings so that tension will result when the unit is attached to the flash.

Note: At this point, the Bounce Flash Diffuser Unit can be installed on the flash unit. This is done by spreading the side wings and sliding the unit over

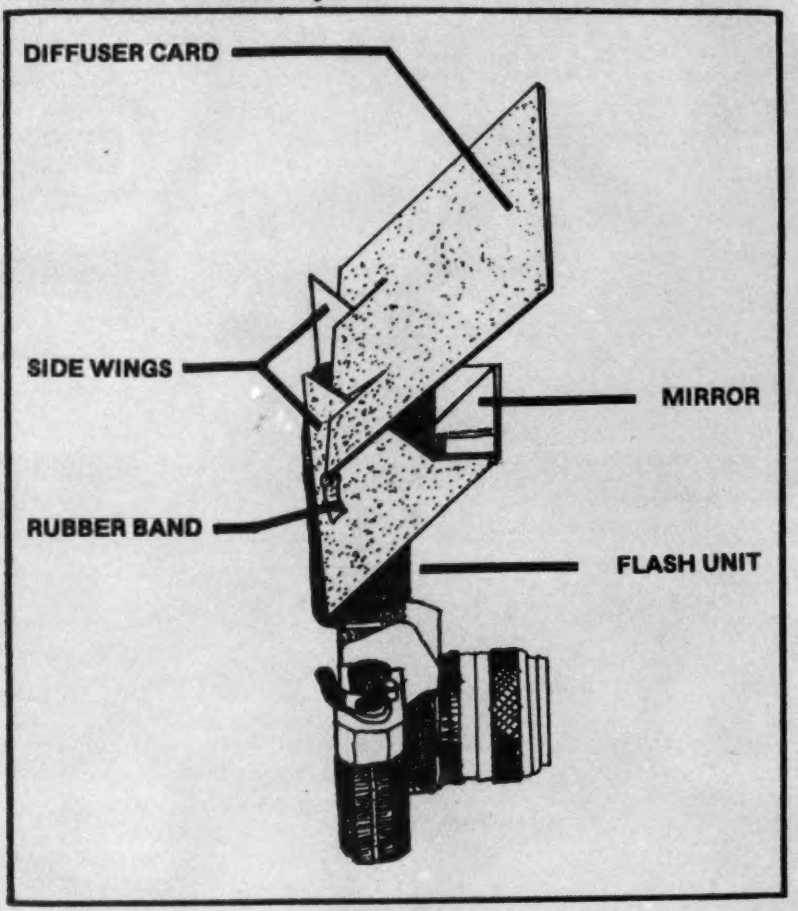
the top of the flash. The unit should be positioned so that the mirror is at a 45 degree angle to the plane of the light source. Use of the unit now will permit the flash to be directed to the ceiling and reflected to the subject.

6. With the unit attached, measure the distance between the side wings. This will be used for the diffuser card.

7. Using a piece of white cardboard or the white side of matboard, cut portion that will be large enough to capture the light reflected off the mirror. Cut slits in the matboard the thickness of the side wings and spaced at the distance measured from the above step.

8. The diffuser card can now be slipped on the side wings. Varying the angle of the diffuser card, the direction and intensity of the flash can be manipulated.

Dan Uebersex



LIGHT REFLECTOR

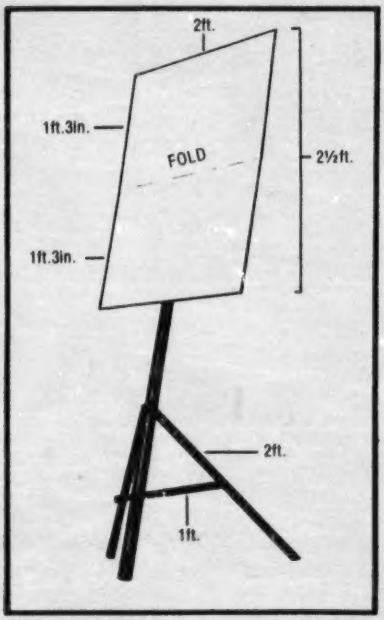
Project: The purpose of this project is to construct a portable light reflector. A light reflector is needed in photography to get rid of unwanted shadows on the subject being photographed. The reflector functions as a fill light source to soften shadows produced by the main light source.

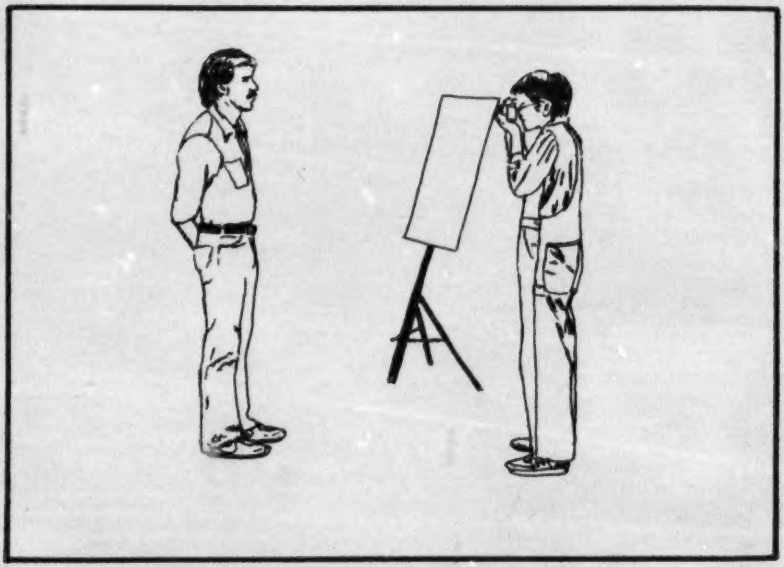
MATERIALS
1. one (1) 5' metal antenna pole
2. two (2) 1' and two (2) 2' adjustable shelving rods
3. one (1) 1' flat metal strip measuring ½"wide
4. two (2) nuts
5. two (2) bolts
6. five (5) washers
7. three (3) wood screws
8. one (1) foam core board measuring 2' x 2½'
9. white plastic tape
10. one (1) wall saver hanger, stick-on type
11. four (4) sewing machine bobbins
12. two (2) pieces of string, 3" long
13. Epoxy or Elmers glue

Construction:
1. Cut the antenna pole in half with a hack saw.
2. Attach two (2) 2' aluminum shelving rods 1' below the center of the antenna pole. These rods should be attached at approximately 75 degree angles from the pole to act as support legs for the pole.
3. Take the two (2) 1' shelving rods and cut a notch with a hack saw through five (5) consecutive holes on one end of each rod.
4. Use a file to widen the notches so that the neck of the wood screws can move in and out freely.
5. Attach the two (2) 1' rods to the center of the two legs of the pole. Use the nuts, bolts, and a washer on each side of the bracing rods for folding action.
6. Screw the wood screws into the pole approximately 9" from the top of the legs at an angle so that the notched ends of the braces can be locked onto the screws easily when the legs are folded out.
7. Take the top half of the pole, the piece with equal sized ends, and punch several holes down one end of the pole 1" apart with a hammer and concrete nail.
8. Use the pointed end of the file to raise the lower lip of each hole.
9. Place the 1' flat metal strip on the opposite side of the pole from the holes with a wood screw and washer approximately 8" from the base of the pole. Bend the metal strip around to the front of the pole slightly
10. Place the bottom end of the upper pole over the top end of the lower pole with the holes facing the front and the legs extending behind. The reflector stand is complete.
11. Cut the foam core board in half to form two (2) equal pieces of 2' by 1'3". Be sure not to cut all the way through the board to allow it to fold.
12. Place white plastic tape down the middle of the fold for added strength.
13. Place white tape around the edges of the board for protection.
14. Place the wall hanger on the outside center of the board while folded. The hanger should be placed so that the board will hang lengthwise when unfolded.
15. Glue the four (4) sewing bobbins to the back of the board opposite each other on each half of the board.
16. Hang the unfolded reflecting board on the stand.
17. Tie the string to the bobbins to hold the board open and flat.

Use: The reflector is ready for use. The legs are adjustable for different reflecting angles. The board may be hung at many different heights. The reflecting board can be folded and tied shut with the string to protect the reflecting surface. The stand can also be broken down and folded for easy transport and storage.

Bo Attwood





CROSS SCREEN FILTER

Project: To construct from inexpensive materials a wire mesh filter to be used in diffusing lights in night photography.

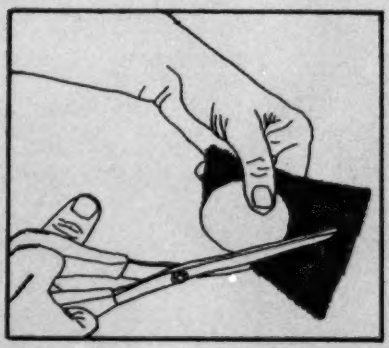
Materials:
1. scrap cardboard
2. a four inch square of wire screen
3. wire cutters or old scissors
4. protective device for lens - such as clear UV filter
5. device to hold mesh in place - such as a flexible rubber lens shade

Construction:
1. Cut the cardboard to a circumference the size of your lens.

2. Using the cardboard circle as a guide, cut the wire screening to size.

3. Place a protective filter over the lens. Place the screen over the filter. Screw in a lens shade or other filter to hold the screen in place.

Use:
The wire filter will diffuse concentrated lights into a star pattern. Note that when using color film, an aluminum screen will give silver lights, a copper screen, gold lights.



Kathryn Langford

30

PHOTOGRAPHIC PROCESSES

The following photographic processes are simple yet effective techniques to add a little variety to darkroom work. All processes can be mastered by students with limited photographic experience. The photosketching and high contrast processes will be particularly useful in producing slide shows and doing line photography for materials to be printed.

PRINTING CONTROL TOOLS

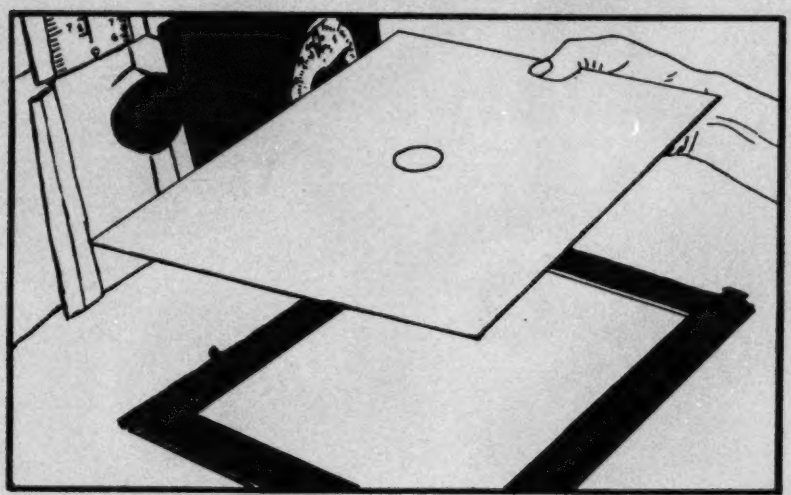
Project: To construct simple tools for use in the printing control techniques of burning in, dodging, and vignetting.

Materials:
1. two sheets of 10 inch by 12 inch opaque paper or cardboard
2. one circular piece of opaque paper or cardboard, approximately one inch in diameter
3. one ten inch piece of thin, stiff wire
4. tape

Construction of tool for burning in:
1. Cut a hole approximately one-half inch in diameter in the center of a piece of opaque paper or cardboard.

2. Tape the circle of cardboard to the end of a piece of thin. still wire.

Use: The purpose of the burning in process is to increase exposure of only a certain portion of a print. This can improve print quality by allowing additional exposure on only the portion of the print that requires the additional exposure. Light areas can be darkened to improve visual quality by bringing out details.



Construction of tool for dodging:
1. Cut a circle of cardboard approximately one inch in diameter.

2. Tape the circle of cardboard to the end of the piece of thin, stiff wire.

Use: The purpose of this process is to lighten certain areas of a print that appear too dark and thus need less exposure time. This will increase print quality by allowing more detail to show in the final print.

Debra Skinner

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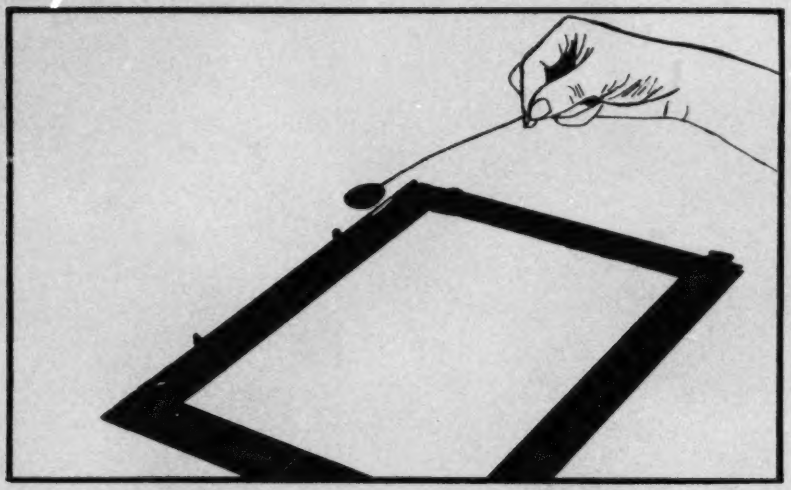
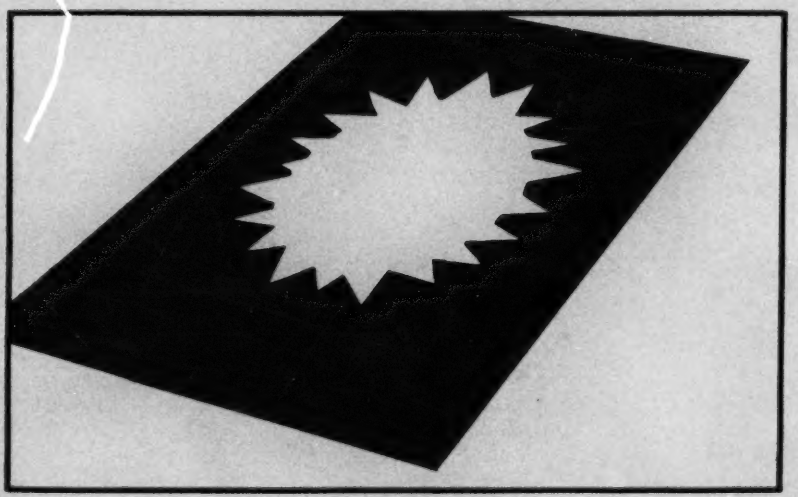


Construction of tool for vignetting:
1. Cut a hole in a piece of cardboard that is slightly smaller than the image desired in the process.

2. Cut notches around the edge of the hole so that no definite border will appear on the finished print.

Use: The purpose of this process is to print only a portion of a picture by blocking out the undesired portions entirely. An enlargement is then made of the portion of the picture that is desired. The purpose of the notches is to prevent a distinct border from appearing around the print.



COMBINATION PRINTING

Process: Combination printing is a process in which more than one negative is used with an enlarger to make a combination print.

Materials:
1. two black and white 35mm negatives
2. 8 x 10" photographic paper
3. black and white enlarger
4. 8 x 10" printing easel
5. vignetter (Cardboard cut to desired shape may be used.)
6. dodging tool
7. darkroom and developing equipment

Procedure:
1. Select two negatives you wish to combine into one print.
2. Determine what parts you wish to use together.
3. Put the negative that will make up the largest part of the picture into the negative holder of the enlarger.
4. Set height of enlarger and focus at the desired print size.
5. Using a plain white sheet of paper inserted into the printing easel, sketch the image cast by the enlarger.
6. Remove the paper, and do a test strip to determine the correct exposure.
7. Record the enlarger position (degree of magnification) and the correct exposure.
8. Remove negative #1 and insert negative #2 in the negative holder.
9. Again set the enlarger position and the correct degree of exposure.
10. Record these settings.
11. Place the sheet of paper with the sketch of negative #1 in the printing easel and determine where you want negative #2 to be exposed in your picture.
12. Sketch in the parts of negative #2 in the places you want it to be on the finished print.
13. Being careful not to move the print holder, slide the photographic paper into place.
14. Hold the vignetter over the photographic paper so that the only area to be exposed will be the area of negative #2 that you wish to appear on the completed print. Keep the vignetter moving slightly in a gentle circular motion to prevent harsh edges from appearing. The area around negative #2 should be soft and feathery.
15. Remove photographic paper being careful to remember which edge was to the left and right of the print holder. Place the photographic paper in the paper safe.
16. Remove negative #2.
17. Replace negative #1 in enlarger. Set enlarger at the exposure determined in step #5.
18. Using the sketch you made in step #8, determine where negative #2 is exposed.
19. Hold your dodging tool in place over this area so that you will not re-expose it.
20. Take photographic paper out of paper safe remembering how it was placed in it. Be sure to position paper as it was for previous exposure.
21. Expose negative #1 onto photographic paper using your dodging tool to keep the area of negative #2 covered. Keep the dodging tool moving so that you will not have harsh lines.
22. Develop print as you would other prints.

Figure 1. Standard print made from negative #1

Figure 2. Standard print made from negative #2

Comments: Patience is the key to a good combination print. You may have to make several prints to get the quality you desire.

Betty Hodgson Seymour

Figure 3. Negatives #1 and #2 combined together for final print.

HIGH CONTRAST

Process: Using high contrast film to produce title slides

Materials:
1. one 35mm camera with macro lens
2. copy stand and two lights
3. Kodalith Ortho Film #2556 and film cassette
4. Kodalith A & B Developer, stop bath and fixer
5. Wratten #1A safelight
6. transparent watercolors or food color

Procedure:
With increasing expenses and decreasing budgets ever in mind, the old reliable slide presentation is looking better all the time. It takes just as much planning, sketching, scheming and brow furrowing for a well-designed slide production as it does for any other format, but expenses are minimal. For a slide production to work, it must flow logically and smoothly from start to finish. Titles and graphics provide continuity while getting the message across in a clear, concise, professional manner.

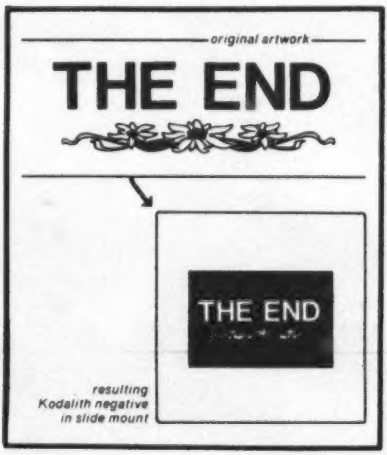
Kodalith Ortho Film 6556, Type 3 is a high contrast copy film with extremely fine grain, clear whites and very dense blacks. When black letters or lines are placed on a white background and copied on Kodalith film, you receive a negative that can be mounted and projected as a slide. The image contrast is reversed from that of the original artwork. These Kodalith negatives provide sharp images even when projected to extreme size over long distances with little loss of quality.

35mm format Kodalith is available only in 100 foot rolls, so a bulk loader and film cassettes are needed. A good bulk loader and film cassettes are needed. A good bulk loader costs $20 and can be purchased in most photography stores. The cassettes are reuseable, but should be discarded after five or six loadings. An old cassette may contain dirt in the felt light trap that will scratch the film emulsion. The loader will enable you to load film in daylight conditions and will serve as a container to store the remainder of the film.
Almost any copy set-up will give good results. The camera needs a steady base because of the very slow film speed. (Kodak rates Kodalith at an ASA of about 8.) The ideal set-up would be a copy stand, but if one is not available, a tripod will work. In either case, two lights are needed to illuminate the copy. The lights should be on either side of the camera and at a 45 degree angle from the surface of the copy. This eliminates shadows on the artwork. Photofloods or quartz lights work equally well.

The secret of making clean Kodalith title slides lies in the preparation of the artwork. The artwork should all be of the same size to simplify exposure calculations. A 6 x 9" rectangle has the same proportions as a 35mm slide and will help visualize the graphic as it will look on the screen. Within this 6 x 9" frame, it is best to use letters that are at least one quarter inch in height to ensure that the audience will be able to read them. Lettering for titles can be made by using any lettering technique as Wrico, Leroy, stencils, Varigraph machines or hand-lettering work. The sharpest images are made with dry transfer (rub-down) lettering.

Pen and ink drawings, charts, abstracts and sketches transfer well to Kodalith. These visuals can be combined with lettering. Very thin lines should be avoided as they tend to block up or not

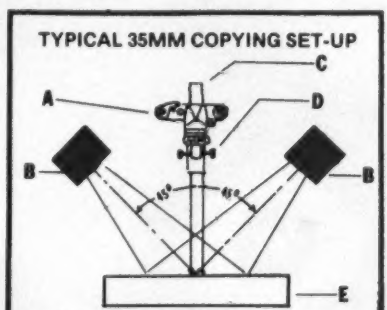
copy well. Cartoons work well and can be used to provide interest within the production. Kodalith is designed to work best with artwork that is prepared in black and white. Other colors could be used, but the results may not prove satisfactory.



Each copy set-up is different, so it is necessary to run a few tests to determine the exposure needed for your particular equipment. Load about ten frames of Kodalith into a cassette and place it in your camera. Set the camera shutter speed for one second. Place a piece of artwork that is typical of what you will be making (number of letters, size of lines, etc.) on the copy board. It is best to use a piece of clean non-glare glass over the copy to hold it in a flat plane. Frame the copy in the camera so that it appears as you want the finished product in size and position. Now make two exposures each at f/4, f/5.6, f/8, f/11, and f/16. This will be the test strip to determine the exact exposure needed. Once the film is developed, pick the frame that has the deepest blacks and cleanest whites. Each line should be complete on the negative. This is the correct exposure for your set-up. A test strip should be made and the correct exposure determined each time changes are introduced. These changes include: using another 100 feet of film, a change in the lights or light position, new types of artwork, or aging of the developer more than 48 hours.

When developing Kodalith film the best results are obtained with Kodak Kodalith developer. This developer comes in two separate packages labeled type A and type B. Each package is mixed with one gallon of water and stored in SEPARATE brown bottles until used. Mix the two solutions only in the proper amount needed immediately, and just prior to its use! Although the A and B solutions store well separately, once mixed they have a life of only one hour.

There are two ways to develop Kodalith film. Since the film is insensitive to the color red, it can be developed in a tray under a Kodak safelight filter number 1A. Place the film in a small tray of developer at 68 degrees F. This way it is possible to observe the development


TYPICAL 35MM COPYING SET-UP
C
A
D
B
B
45°
45°
E
A -35m camera with macro lens
B -Two lights set at 45 degree angle to vertical post
C -Top post of copystand, contains mount for camera
D -Focus rail of copy stand, used to position camera to obtain desired degree of magnification on film
E -Base of copy stand, also holds the artwork to be copied

taking place and stop it at the proper moment by dipping it into a tray of stop bath. Now fix the film in a tray of fixer. This method works well as long as there is only a limited number of negatives to develop.

For consistent results, the film can be developed in a developer tank. The film can be loaded on reels and placed in light tight tanks under 1A safelights. Mix only enough developer to fill the tank used. Both the A and B solutions should already be at 68 degrees F. The solution should consist of exactly 50%A and 50%B. Pour the developer into the tank and start timing the process. Agitate every 30 seconds for small tanks and 60 seconds for large tanks. The time range for Kodalith in Kodalith developer is 2¾ to 3¼ minutes. A standard developing time of 3 minutes works well. At the end of 3 minutes, pour out and discard the developer. Use stop bath, fixer and wash as usual. Hang the film up to dry.

The Kodalith negatives can be bound in a slide mount and used as is; however, the image will be very bright in a dark room. The addition of color to the slide will allow the audience to read the information without eye strain. The easiest way to color in a Kodalith slide is to bind it with a colored gel such as a photographic filter, color background overhead transparency film, or cellophane. This gives an even color to the slide. For best results the slide holder should have glass on both sides to keep the gel and the negative in close contact.

Another method that works well is to soak the negatives in a bath of transparent water colors such as Dr. Martin's Synchromatic Water Colors. Dr. Martin's can be bought from most art supply houses. If it is not available, a solution of water and common food coloring will work well. For best results, mix the food coloring with a solution of water that is 5% Kodak stop bath. Prepare the negative by rubbing a Q-tip soaked in stop bath over the emulsion side of the negative. Then, let the negative soak in a shallow tray of the color. The longer the negative soaks, the better the color will saturate the film. It usually is best to remove the film in about 1½ minutes. Rinse the negative under running water, dry and mount.

If two colors are desired on the same negative, they can be done in the following manner. Cut two pieces of cellophane tape that are slightly larger than the area where the second color is desired. Place the tape over this area on BOTH sides of the negative. Soak the negative in the first color, rinse, remove the tape and let the negative dry. Next, cover the negative with tape on both sides except where the second color is desired. Soak the negative in the second color, rinse, remove the tape and dry. Rubber cement may be substituted for the tape in masking the negative. It may be necessary to add a small amount of ink to the rubber cement in order to see exactly where the masking is taking place.

Once you have used Kodalith film negatives, you will be finding more uses for them almost daily. They lend themselves well to experimentation and provide quick, visually exciting additions to any slide presentation.

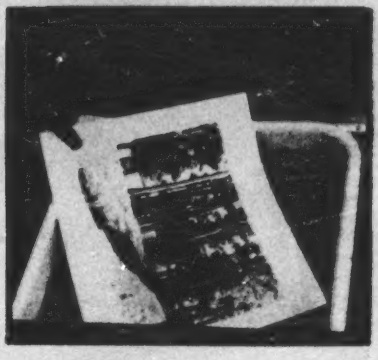
Jim Hurt

SEPIA TONING

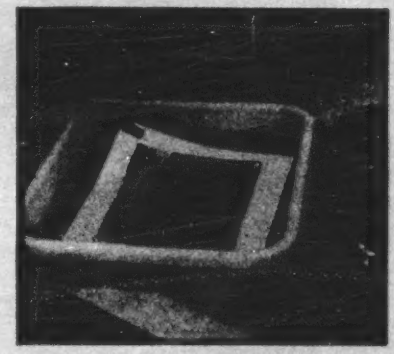
Process: To produce prints with warm brown tones from black and white prints, using a process called Sepia Toning.

Materials:
1. Kodak Sepia Toner (consists of 1 package of dry bleach and 1 package of dry toner).
2. a print processed in nonhardening fixer
3. 3 trays (do not use metal trays).
4. tongs.
5. sink with running water.

Procedure:
1. Under normal lighting conditions, prepare bleach and toning bath in separate containers following the instructions on the packets.
2. Pour enough bleach and toner bath to cover the print you are going to use in separate trays.
3. Place the print in the tray that contains the bleach. Agitate the bleach until the black image has disappeared or the print has turned yellow.



4. Rinse the bleached print for 2 minutes in running water.



5. Place the rinsed print in the toning bath. Agitate for approximately 30 seconds or until there is no further change in the tone of the print.
6. Remove the print from the toning bath and rinse thoroughly in running water.
7. Fix the print in fixer with hardening agent.
8. Wash for 5 minutes.
9. Hang to dry.

Comments:
1. Consider the suitability of the print for toning. Do not tone unless the print will be improved.
2. Eliminate the hardening agent from the fixer when processing the original print as hardener retards toning action.
3. The original print should be thoroughly washed.
4. Two-bath toners such as sepia toner may be used with both warm-tone (fine-grain) and cold-tone (coarse-grain) paper. Cold-tone paper is recommended.
5. Better results will be achieved with continuous-tone prints rather than with high-contrast prints.
6. Use slightly darker prints to allow for reduction in depth due to bleaaching.

Alayne Smith

PHOTOSKETCHING

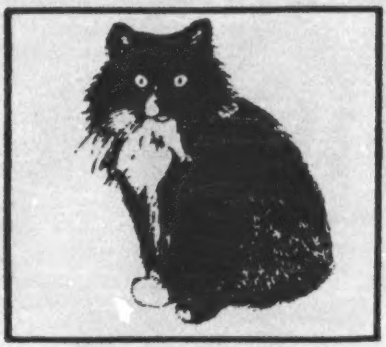
Debra Hargroves

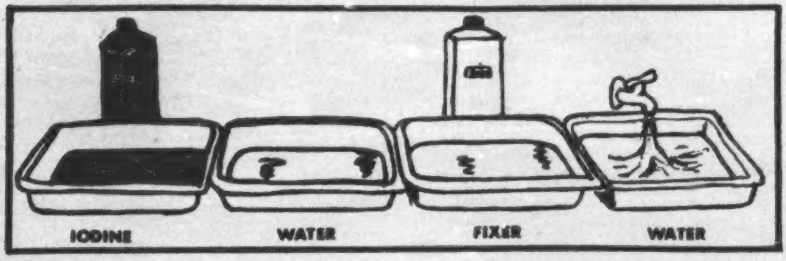
Process: To create a professional looking sketch that can be used for copying and reproduction techniques such as diazo, thermomaster, photographic silk screen, offset, letter press, electronic stencil, spirit and more.

Materials:
1. Continuous tone photograph (matte-surfaced and generally light prints work best).
2. Waterproof ink and a pen (get different effects using different pens and inks).
3. Tincture of iodine, available at your drugstore, mixed half and half with water. The larger your prints and trays, the more iodine you will need.
4. Four trays the size of your prints.
5. Photographic fixer and running water.
6. Tongs.

Procedure:
1. Outline and sketch in the areas of a continuous tone photograph that you want to be in the line drawing. Unsketched portion of a photograph will bleach out or can be retained if desired by covering the areas not to be bleached with rubber cement.
2. Let the ink dry completely (at least 40 minutes).
3. Place the photosketch in a tray of the iodine solution, image side up, and do not touch the ink image during the process.
4. Remove the photosketch from the iodine with tongs when all of the dark parts of the photographic image have turned a dark brownish orange.
5. Rinse in a tray of water.
6. Place the photosketch in a tray of photographic fixer until all traces of the yellow stain have disappeared.
7. Rinse in running water for five minutes.
8. Dry the print (in open air or in a photographic dryer).

Comments: Using this procedure, anyone can create professional looking sketches. You can add or omit detail, clarify images, or photosketch only selected parts of a photograph. The unsketched portions of the photograph can be bleached out or preserved using rubber cement. This process does not require much equipment and produces great results.

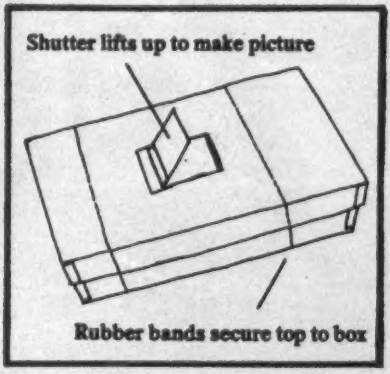




PINHOLE PHOTOGRAPHY

Project: The pinhole camera is an easy to build project that is capable of taking good pictures, and clearly demonstrates how a camera works.

Materials:
1. one shoebox or similar box with a fitting lid, the box itself measuring about 6" deep
2. thin cardboard
3. black electrical tape
4. heavy-duty aluminum foil
5. one (1) #10 needle
6. mat knife
7. scissors
8. steel ruler
9. flat black paint



Construction:
1. Paint the inside of the box and the inside of the lid with flat black paint and let it dry.
2. Cut a 2½" square of cardboard for a shutter and paint it black.
3. With the mat knife, cut a hole ½" square in the center of the lid.
4. Cut a 1½" square of heavy aluminum foil. Handling it carefully, lay it on cardboard.
5. Carefully pierce a hole in the middle with your needle, stabbing straight down so that the hole is round and even. This is your pinhole.
6. Lay the foil square on the inside of the lid over the ½" square hole. Be sure the pinhole is centered. Tape down carefully on all four sides with black tape.
7. Cut a piece of black tape 2½" long.
8. Lay your 2½" cardboard shutter on the outside of the lid, covering the hole.
9. Tape down one edge so that the shutter will open and close like a door. Your camera is complete.

Use: To photograph with your camera, you will need photographic paper - single weight, Kodabromide #2 recommended; developer, stop bath and fixer; masking tape, and a good contact printing frame. Working in a darkroom with a yellow safelight, take a 4 x 5 sheet of single weight photographic paper. If you have a packet of large sheets, cut them in four. Place a piece on the bottom of the box, centering carefully, and tape it down with four pieces of masking tape. Be sure the emulsion side of the paper is up. Close the box. Tape the shutter closed with a bit of masking tape. You are now ready to photograph.

It is best to work outdoors on a sunny day. Set your camera on the ground or on a stable surface, prop it at the proper angle so that the pinhole points toward what you want to photograph, wedge it tightly or put a weight on top of it if the wind is blowing. Carefully open the shutter and begin timing. A sunlit subject on a bright day will take about 1½ to 2 minutes; a shaded subject will take considerably longer. Trial and error is necessary to determine exposure time for your camera. When the time is up, tape the shutter closed again. It is very important that you remember not to open your camera until you get back to the darkroom. Keep a record of subjects, lighting and exposure times. In the darkroom, take out the paper and develop according to directions. This will give you a paper negative. To make a print, take another piece of photographic paper the same size, turn the emulsion side up, and lay your negative face down on top of it. Put in a contact printing frame and expose to a strong light, according to directions. Develop as you developed your negative. Now you have your print.

If something goes wrong it is likely to be a defective pinhole. Remove the original one and make another. If the negative is dark-streaked it may be a light-leak in the box. You can test for a light-leak by putting paper in the camera, taking it out in the sunlight without opening the shutter, then developing. The developed paper should be completely white; if it is darkened anywhere then there is a light leak in the box. Tape the edges of the box with electrical tape and paint inside again.

Some things to experiment with:
Use a longer photographic paper, 5x8", 8x10" or whatever will fit your camera. Tape the paper to the side instead of the bottom and see what sort of image you get. Curve the paper so it bends around one or more corners and see what sort of image you get. Make another pinhole on the side of your camera and tape the paper opposite it. This will give you a different focal length. Take pictures of the same scene using different focal lengths and compare. When using one pinhole, be sure to keep the others taped shut. Make a picture with several pinholes open at once for multiple exposure. Make a foil square with several pinholes grouped close together for a prismatic effect. Add or take away an object during exposure for a "ghost image". Focus on something that moves rythmically, like a sprinkler or leaves blowing in the wind, and see what sort of time exposure of motion you can get.

Marianne Brumby Gail McInish

Paper Negative

Contact Print

PHOTOGRAMS

PHOTOGRAMS WITH AN ENLARGER

Process: To make photographs without the use of a camera or negative, by arranging objects on a sheet of photographic paper.

Materials:
1. enlarger
2. yellow safelight
3. resin coated photographic paper
4. print developer (Dektol)
5. stop bath
6. fixer (hypo) solution
7. four (4) washing trays
8. print tongs
9. objects for picture (keys, scissors, leaves, etc.)

Procedure:
1. All work must be done in a darkroom, using only a yellow safelight.
2. Place a sheet of photographic paper on the easel of the enlarger. The emulsion side must be facing up.
3. Place some opaque or semi-opaque objects on the paper. Leaves, shells, marsh grass, paper cutouts and letters, even your hand or a pair of scissors, are good props for making photograms.
4. When the arrangement suits you, position the head of the enlarger about 3' above the easel, and set the lens aperture wide open.
5. Turn the enlarger on for an exposure of 1 second.
6. Develop the print in ordinary developer until the background is a rich deep black while most of the image remains bright and clear. Developing time will be about 3 minutes.
7. Process the print in stop bath and fixer and rinse as usual.

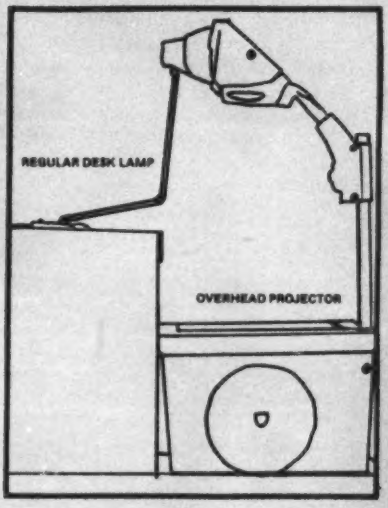
Comments: The photogram process can be learned and images produced and developed on the first day of a class. It gets students involved with composition and takes some of the mystery out of the darkroom. For this reason alone the photogram process is a valuable experience; however, it can be an art form in itself. The range of techniques to produce multi-tone images offer an almost unlimited field for exploration. Photograms can be abstract or pictorial, positive or negative images. Most of all, photograms can be fun.

PHOTOGRAMS WITHOUT AN ENLARGER

Materials:
1. overhead projector
2. gooseneck or high intensity desk lamp
3. yellow safelight
4. resin coated photographic paper
5. print developer (Dektol)
6. stop bath
7. fixer solution
8. four (4) developing/washing trays
9. print tongs
10. items for picture

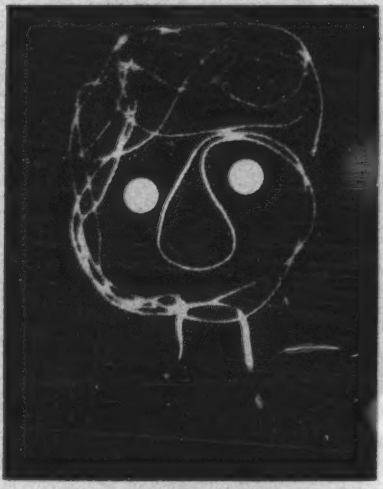
Procedure:
1. Do all work in a room that can be darkened and that has running water. A

darkroom or bathroom may be used.
2. If using a regular gooseneck desk lamp, make a cardboard mask for the lamp with a hole in the center for the light. Tape the mask to the lamp, covering the entire edge of the lamp with tape. This prevents some diffusion of light. If using a high intensity lamp, the mask is not necessary because the lamp will better fit with the overhead projector.



3. Set up the lamp and overhead projector so that the lamp is shining into the top part of the projector. Put the lamp up to the lens of the overhead. This projects the light onto the stage of the projector. Leave the lamp on only for short periods of time. It could melt the lens of the overhead projector.
4. Using a piece of plain white paper the same size as your photographic paper, check to see how the light falls onto the stage of the projector. Adjust paper and light so that light falls on the paper.
5. Working under a yellow safelight, arrange the materials on the shiny surface of a piece of photographic paper.
6. Expose the array to a white light. Do this by turning lamp on and immediately turning lamp off. Any longer exposure than an immediate on-off light will result in a completely (or nearly so) black piece of photographic paper.
7. Place the exposed paper in developer until the black areas are solid and glossy in tone (1 to 2 minutes).
8. Process in stop bath and fixer and rinse as usual.

Comments: Either a gooseneck lamp or a high intensity lamp will produce good results. Without the overhead projector, there is too much diffusion of light which results in very little detail.



PHOTOGRAMS USING BLUEPRINT PAPER

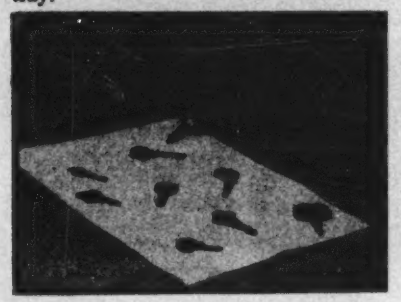
Process: To make photograms without the use of a darkroom, expensive equipment or supplies, by using blueprint paper, the sun, and 3% hydrogen peroxide.

Materials:
1. 1 or 2 containers (plastic trays, dishpans, or pails)

2. sink (in place of second tray)
3. measuring cup
4. tablespoon
5. tongs (if desired)
6. glass sheet (if desired)
7. composing board or tray (if desired)
8. scissors or paper cutter
9 assortment of objects with which to make designs
10. paper towels
11. blueprint paper
12. 3% hydrogen peroxide
13. water

Procedure:

1. In one of the containers, mix 1 tablespoon of hydrogen peroxide with 1 cup of water. This solution forms the fixer which is needed to make the picture permanent. Use only freshly mixed fixer.
2. In the other container, place the water. This will form the rinse bath.
3. Take the blueprint paper to a darkened room, cut the length desired, and place on the composing board or tray.



4. Arrange an assortment of objects on the blueprint paper (making sure the blue side of the paper is up) and place a glass sheet on top if the objects are not three-dimensional. This will keep the paper flat during exposure. The paper can also be held flat just by placing a few heavy objects on the corners and incorporating the object's shapes into the design. Flat objects produce the clearest shapes.
5. The composing board is now taken to a windowsill or outdoors. Let the sun shine directly on it for 1 to 2 minutes. Exposure time will depend on the strength of the sun. The background of the paper should turn slightly darker than its original color, while the covered portions remain the same color. The exposed areas do not turn a bright blue until the paper has been placed in water.
6. After the objects have been removed from the paper, the paper should be immersed in the fixer for a few seconds. When the background of the sun print becomes bright blue, leaving clear white or light blue images, the picture is ready to be rinsed.
7. Place the print into the rinse bath for just a few seconds, then blot the print or place it on a paper towel to dry.

Comments:Low cost and large size are the main attractions of this type of blueprint paper. The main disadvantage is it is sometimes hard to locate. Following is an address where blueprint paper can be purchased: Workshop for Learning Things, Inc., 5 Bridge Street, Watertown, Massachusetts 02172

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DRY MOUNTING

Process: Dry mounting is an easy, neat, and quick method of mounting photographs. Either an electric hand iron or a dry mount press can be used to provide the heat necessary to the process. The electric iron method is particularly convenient for home use or in situations wheh a dry mount press is not available. However, it is easier to provide even heat and pressure with the use of the press. Good results can be obtained with the use of proper procedures regardless of which method is used.

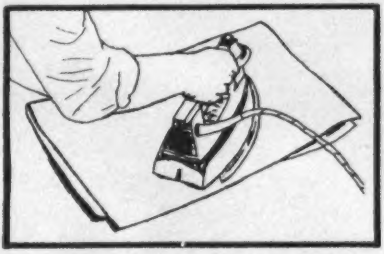
DRY MOUNTING WITH AN IRON

Materials:
1. scissors
2. cardboard or mountboard
3. dry mount tissue
4. hand iron
5. weights (books work fine)
6. print
7. paper

Procedure:
1. Set the iron on rayon or low.
2. Preheat the cardboard and print for 10 seconds to remove any moisture from them.
3. Place paper (a paper bag will do) on the table to protect the table top.
4. Adhere the dry mount tissue to the center of the back of the print by touching iron directly to the tissue. (Figure 1)

5. Trim the print and tissue together on all sides.
6. Align the print on the cardboard.
7. Tack the tissue to the cardboard in two corners. (Figure 2)

8. Cover the print with a clean sheet of thin paper. Seal the print to the cardboard by applying pressure and heat in a slow circular motion for 15 seconds. Be sure to use a moderate amount of pressure and move from the center of the print outward so all parts receive heat and pressure for about 5 seconds. (Figure 3)



9. Cool the mounted print under a weight for one minute or more. This step is very important because this is when the actual sealing takes place.

DRY MOUNTING USING A DRY MOUNT PRESS

Materials:
1. print
2. dry mount press
3. mounting tissue

4. tacking iron
5. Kraft paper
6. chip board
7. metal ruler
8. exacto knife
9. cotton gloves
10. weight

Procedure:
1. Set the temperature control of the mounting press at 180-200 degrees Fahrenheit. Leave the press closed but not clamped shut, so that the rubber base pad can warm up.
2. Set the tacking iron at a medium temperature.
3. Place the chip-board and the print between sheets of clean Kraft paper and pre-dry fourty-five seconds in the press to drive out the excessive moisture. Wear cotton gloves when handling prints to prevent damage to the print.
4. Place the print to be mounted face down on a clean smooth paper surface.
5. Lay a sheet of mounting tissue on the back of the print.
6. Stick the tissue down with a light stroke of the tacking iron. Tack the tissue to the print on only one spot, preferably near the center, using light pressure. A heavy touch will leave a mark on the print face. (Figure 1.)

7. Trim the tissue to the size of the print, using an exacto knife and a straight edge. (Print trimming boards are likely to leave a slightly rough edge.)

8. Place the print with the attached mounting tissue face up on the chip-board, carefully aligning two edges.
9. Holding the print firmly in place, lift a corner and stick the tissue to two corners of the chipboard with the tacking iron. (Figure 2)

10. Slide the chipboard (print face up) between two layers of Kraft paper and place in the pre-heated mounting press.
11. Lock the press for 30 to 60 seconds. (The time required for a good bond depends upon the temperature of the press, the thickness of the cover sheet, and the weight of the chipboard.)
12. Remove the mounted print from the press and immediately place it under a weight. (Figure 3) If the print has not fused completely to the mounting board, press it longer.

13. After the print has cooled, cut the chipboard to the exact size of the print using an exacto knife and a metal ruler to make an even and smooth edge.

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The following items are available from Eastman Kodak Co., 343 State Street, Rochester, N.Y. 14650. For a complete listing of Kodak amateur and professional publications, request a free copy of Kodak publication L-5, *Index to Kodak Information.* Many of the items below may be purchased at local camera stores.

AB-1 *Filters for Black-and-White and Color Pictures*

AC-6 *Photography is . . .*

AC-7 *Help Your Community . . . Through Photography*

AC-56 *Advanced Camera Techniques for 126 and 35mm Cameras*

AE-7 *New Adventures in Indoor Color Slides*

AE-9 *New Adventures in Outdoor Color Slides*

AE-10 *Good Color Pictures - Quick and Easy*

The Here's How Series (AE-81 through AE-95)

AF-1 *Kodak Films for the Amateur*

AG-18 *Creative Darkroom Techniques*

AG-19 *Bigger and Better Enlarging*

AJ-2 *Basic Developing, Printing, Enlarging*

AR-21 *Kodak Master Photoguide*

E-77 *Kodak Color Films, 6th. ed.*

ED-11-1 *Classroom Projects Using Photography, Part I: For the Elementary School Level*

ED-12-1 *Classroom Projects Using Photography, Part II: For*

The Secondary School Level

J-1 *Processing Chemicals and Formulas, 7th ed.*

K-13 *Photolab Design*

M-1 *Copying, 8th ed.*

N-12A *Close-up Photography [Vol. I]*

P-2 *Photography Through the Microscope, 6th ed.*

R-20 *Kodak Darkroom Dataguide, 5th ed.*

R-28 *Kodak Professional Photoguide*

S-30 *Planning and Producing Slide Programs*

Encyclopedia of Practical Photography (ZA-1 through ZA-14)

CASSETTE TAPES

Kode word Darkroom Cassettes provide detailed audio instructions for processing several types of photographic material. Available at camera stores or from Eastman Kodak.

TC-1 *How to Process Black and White Film and Prints*

TC-7 *How to Process Ektachrome Slides Using Process E-6*

TC-8 *How to Process Color Prints in Tubes Using Kodak Chemicals*

FILMSTRIPS

Creative Photography - Camera Series, 6 filmstrips on cameras and camera operation, exposure and composition. Arizona State University.

Creative Photography - Darkroom Series, 6 filmstrips on developing and enlarging photographic materials. Arizona State University.

AUDIO/SLIDE SETS

The following are available from Eastman Kodak Company. Most are available for free loan to schools and institutions. Many may be purchased if heavy usage is expected.

Film - How It Works
Basic Picture-Taking Techniques
The Beginnings of Photographic Composition
Advanced Camera Handling
Photo Reports Make It Happen
Better Pictures by Existing Light
Processing Black and White Film
Beginning Black and White Printing
Advanced Black and Whtie Printing

16MM MOTION PICTURES

Both films listed are available on a free loan basis from Eastman Kodak Company. Both may be purchased if heavy usage is expected.

Photography - How It Works
The Film/Paper Story